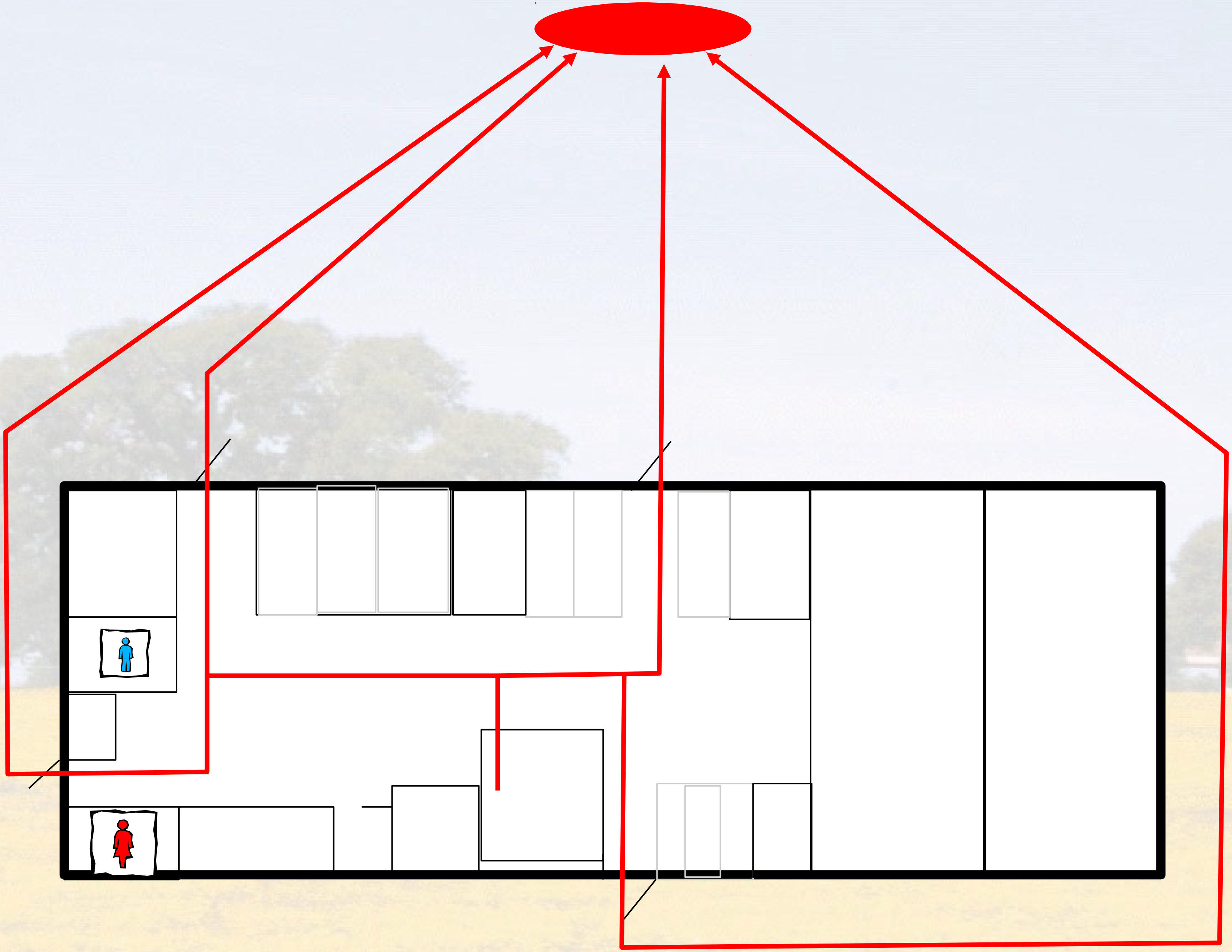
Camp Stanley Storage Activity Status Update

June 27, 2012

INTRODUCTIONS AND WELCOME



Emergency Evacuation & Restrooms

Agenda

- Introduction
- SWMU and AOC Updates
- Groundwater
  - Groundwater Monitoring Update
  - CS-13
- Treatability Study Updates
  - SWMU B-3
  - AOC-65 SVE
  - AOC-65 ISCO
- Closure Path for EPA Order
- Site Visits
  - SWMU B-3 Bioreactor Building
  - CS-13
- Adjourn

STATUS OF REMAINING SITES

Site Closure Status

Recent TCEQ Closure Approvals: 4

RMU-2
AOC-72
AOC-74
WWTP

Field Efforts Complete or Nearly Complete

AOC-51
SWMU B-4
RMU-5
SWMU B-34 (APAR)
AOC-65 (IRA)

Field Efforts Remaining

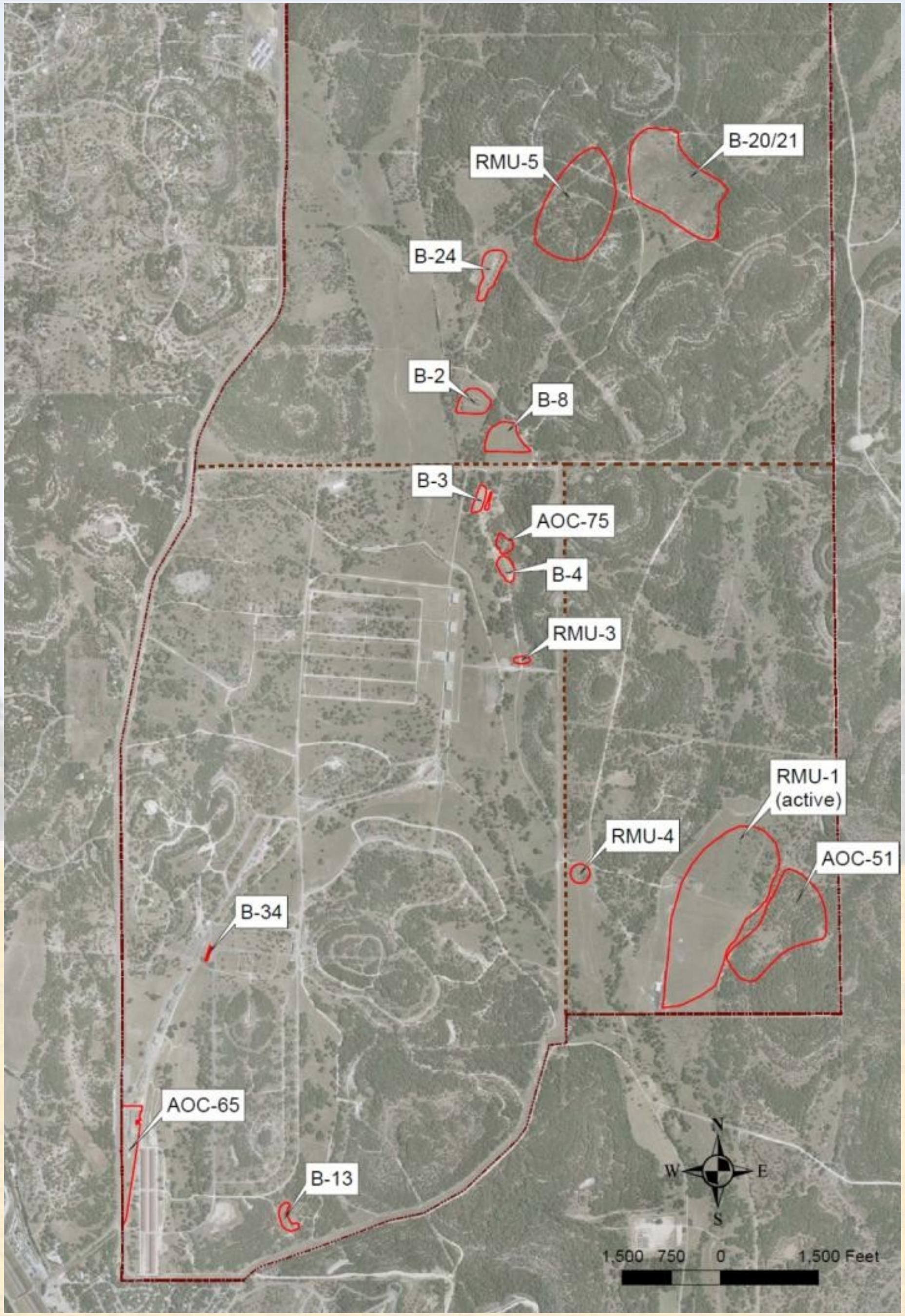
SWMU B-13
AOC-75
RMU-3
RMU-4

Consolidated Sites with RMU-1 (Active Range)

SWMU B-2
SWMU B-8
SWMU B-20/21
SWMU B-24

Groundwater Sites

AOC-65
SWMU B-3

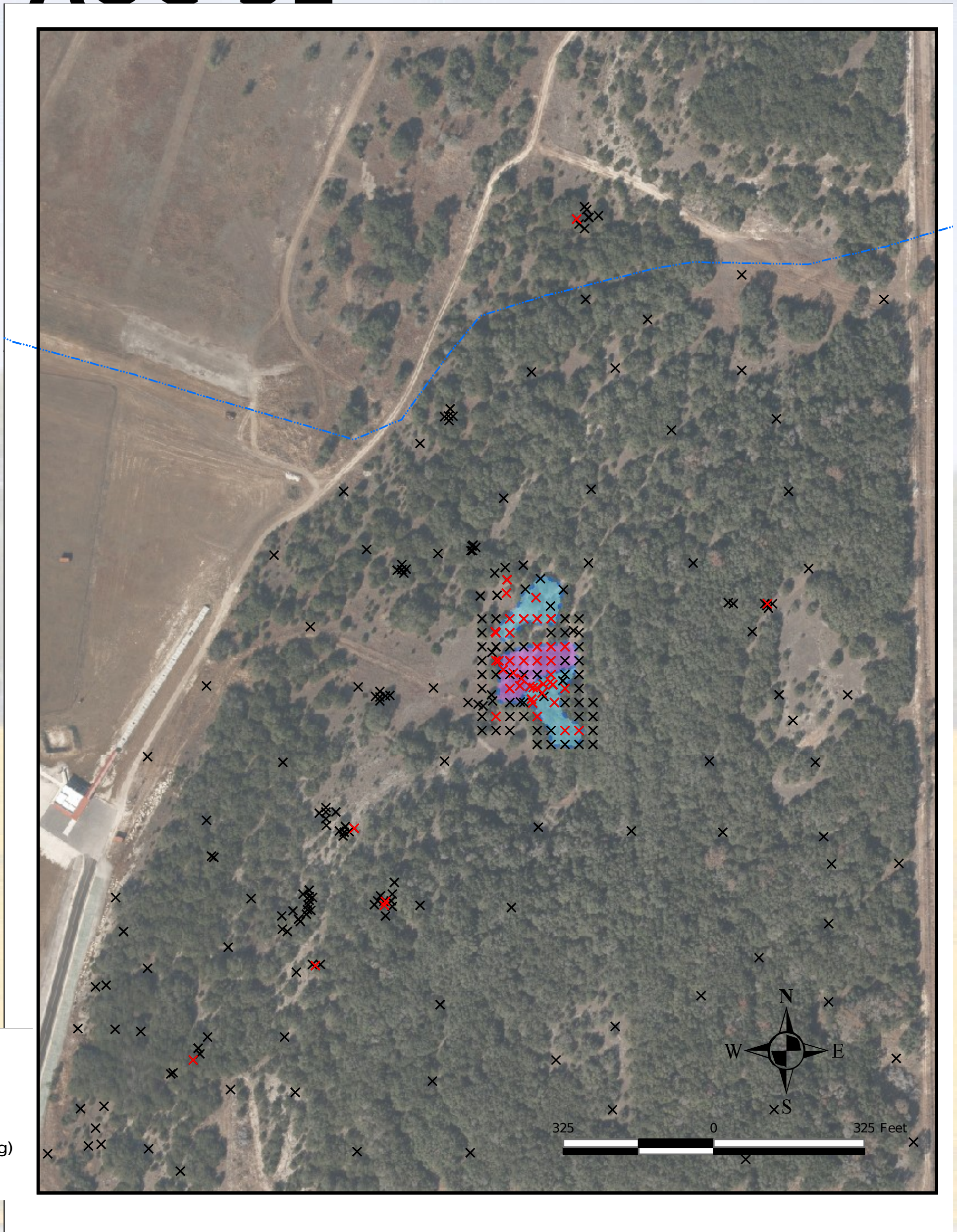

RMU-5
B-20/21
B-24
B-2
B-8
B-3
AOC-75
B-4
RMU-3
RMU-1 (active)
RMU-4
AOC-51
B-34
AOC-65
B-13
N
W
E
S
1,500 750 0 1,500 Feet

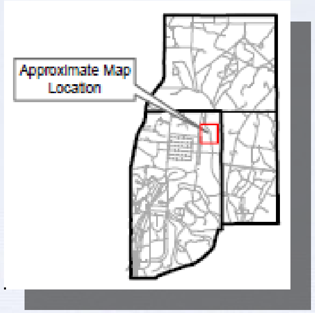
FIELD EFFORTS COMPLETE OR NEARLY COMPLETE

Site Closure Updates
AOC-51

Approximate Map Location

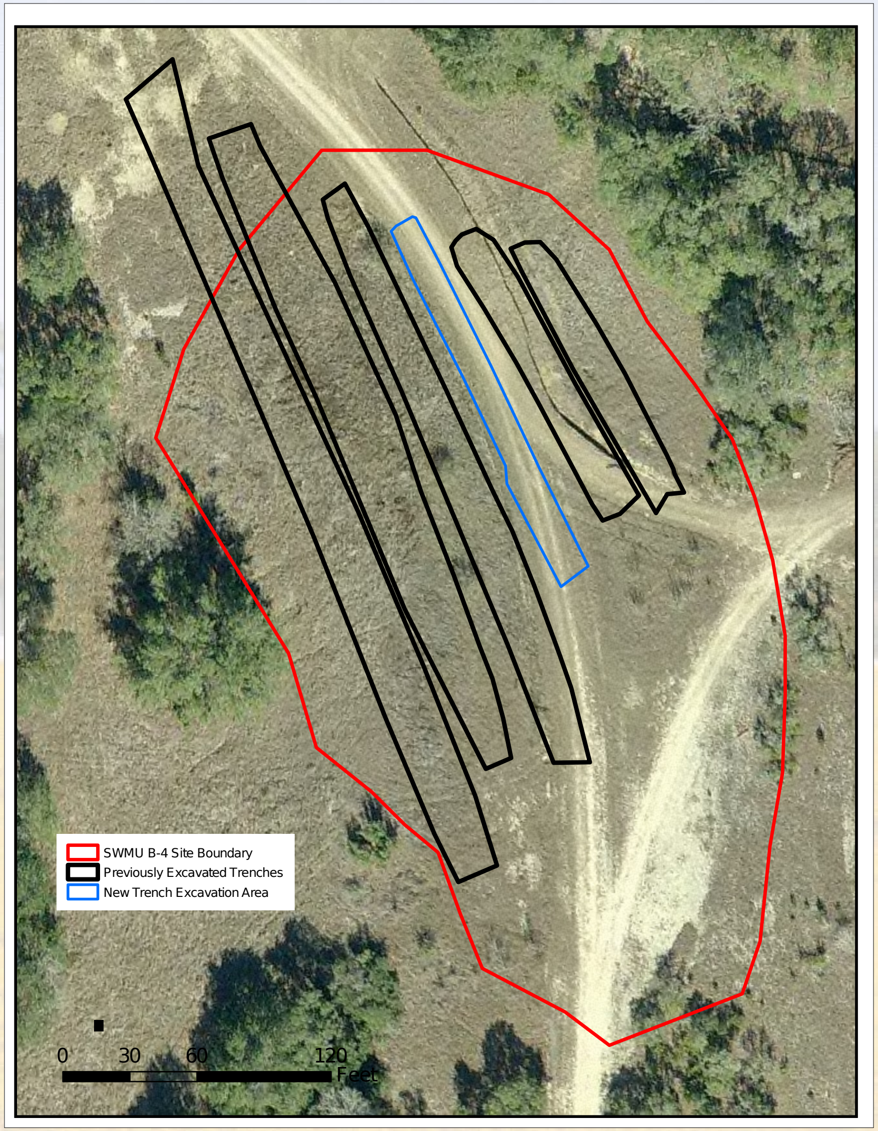
- Scattered ordnance debris site, 29.2 acres
- Investigation efforts to date:
  - XRF analysis, surface soil sampling and UXO investigation
  - Excavation of approximately 1,300 CY of contaminated soil, March 2012
  - Calculated 95% Upper Confidence Limits (UCLs) per TAC 350.79(2)(A) for lead and zinc which do not exceed the Tier 1 PCLs.
- Next steps:
  - Submit RIR to TCEQ

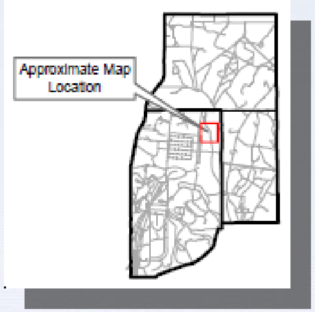

N
W
E
S
325
0
325 Feet
AOC-51 Boundary
Excavated to 1'
Excavated to 2'
Intermittent Stream
Soil Sample
Soil Sample with result above Tier 1 PCL
XRF Location with Pb or Zn result above Tier 1 PCL (mg/kg)
XRF Location


Approximate Map Location

Site Closure Updates
SWMU B-4

- Disposal area, 2 acres
- Investigation efforts to date:
  - Geophysical and soil gas surveys, soil sampling
  - Excavation of 4 waste trenches (9,110 CY) by Weston, March 2011
  - Discovered additional trench during surficial overage sorting, August 2011

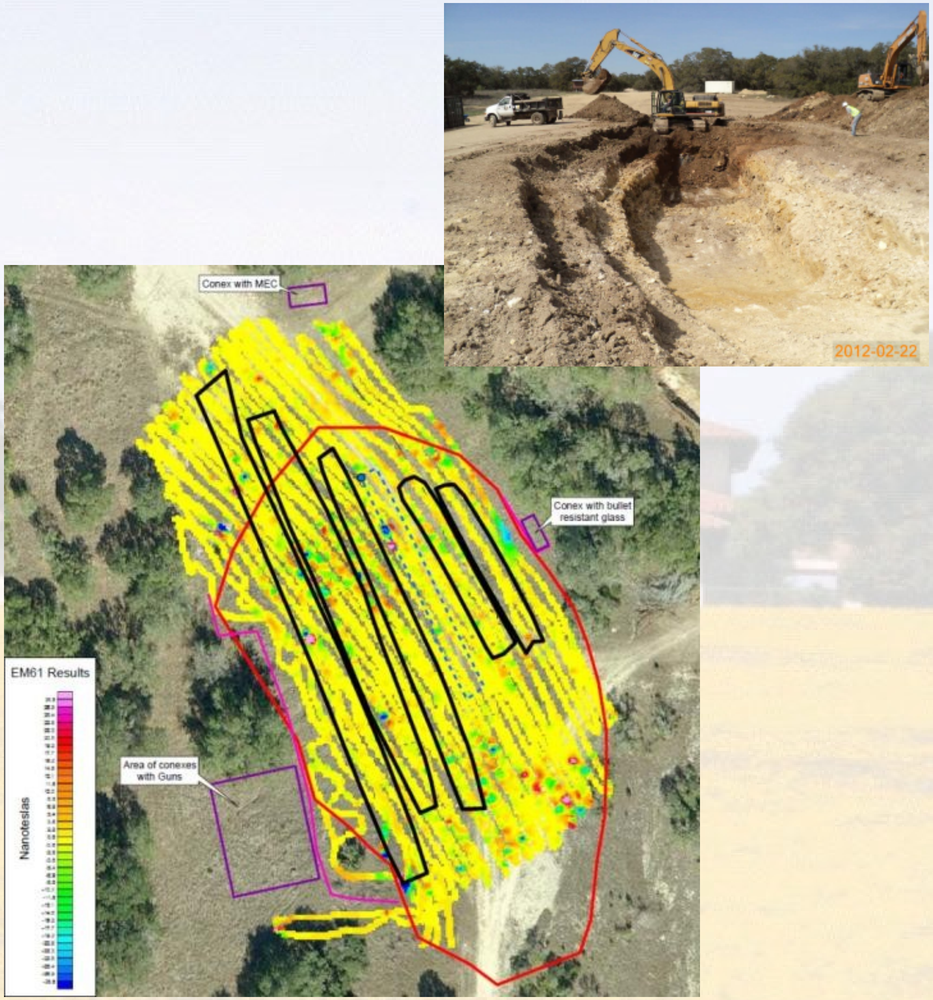

SWMU B-4 Site Boundary
Previously Excavated Trenches
New Trench Excavation Area
0
30
60
120
Feet


Approximate Map Location

Site Closure Updates

SWMU B-4 (Cont.)

- Investigation efforts to date, cont.:
  - Excavated one additional trench, 15 ft x 200 ft x 16 ft (2,100 CY), March 2012.
- Next steps:
  - Weston to submit APAR.

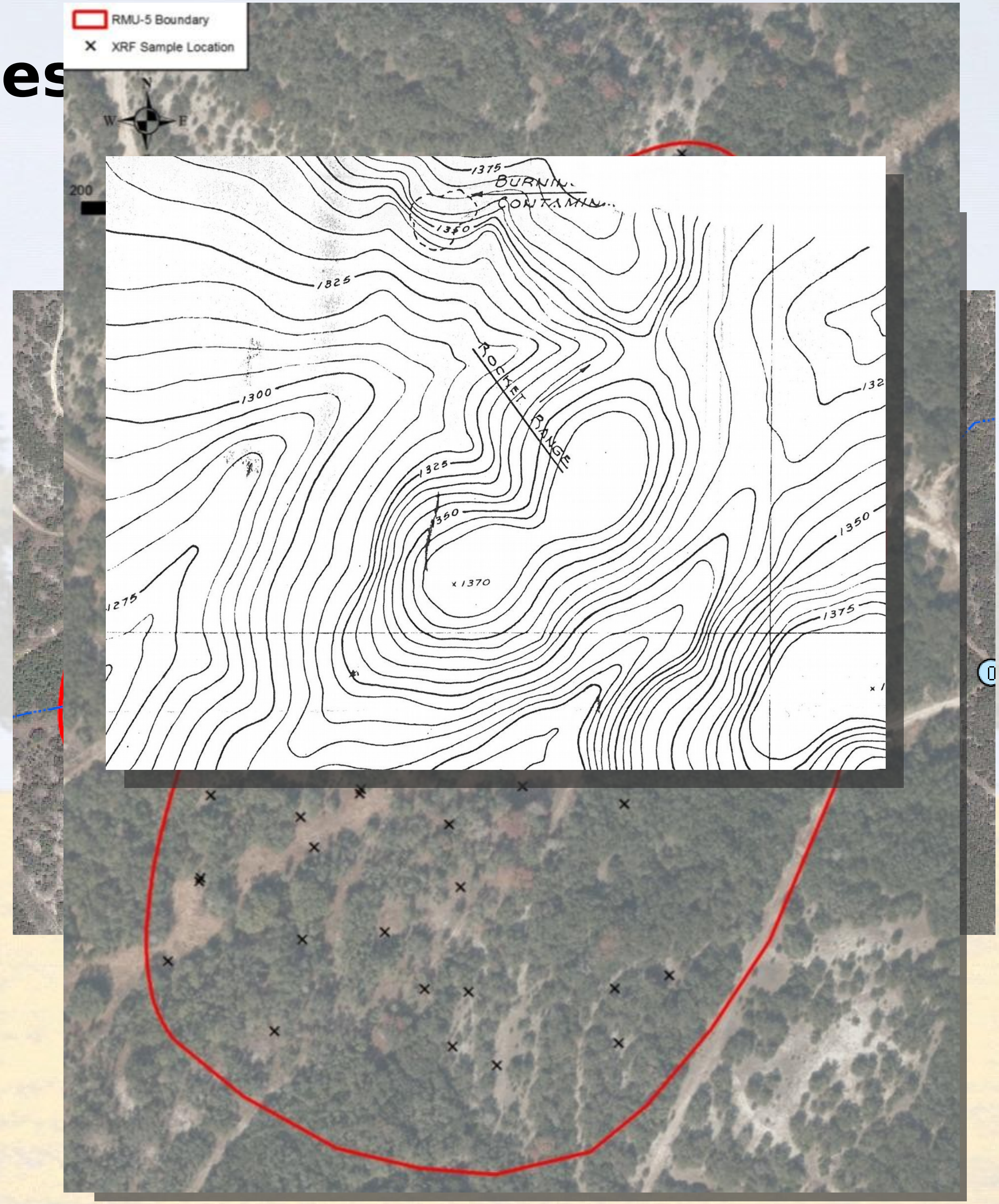

2012-02-22
Conex with MEC
Conex with bullet resistant glass
Area of conexes with Guns
EM61 Results
Nanoteslas

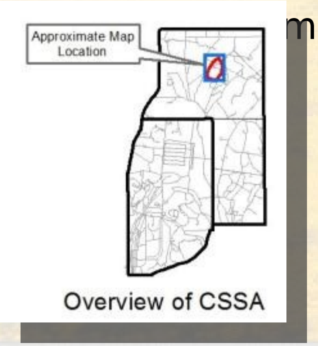
Site Closure Updates
RMU-5

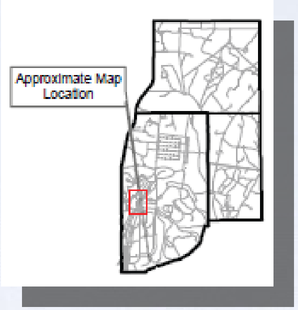
- Rocket range depicted on 1953 topographic map, 19.3 acres

- Investigation efforts to date:
  - XRF analysis and surface soil sampling
  - Calculated 95% Upper Confidence Limits (UCLs) per TAC 350.79(2)(A) for chromium which does not exceed the Tier 1 PCL.
  - Perimeter investigation of neighboring SWMU B-20/21: All MD indicative of kickout from SWMU B-20/21. North Pasture UXO investigation; no evidence of rocket range found

- Next steps:
  - Await R m TCEQ.


RMU-5 Boundary
XRF Sample Location
N
W
E
200
1375
BURNIN
CONTAMIN
1350
1325
1300
ROCKET RANGE
1325
1350
x 1370
1275
1350
1375
132

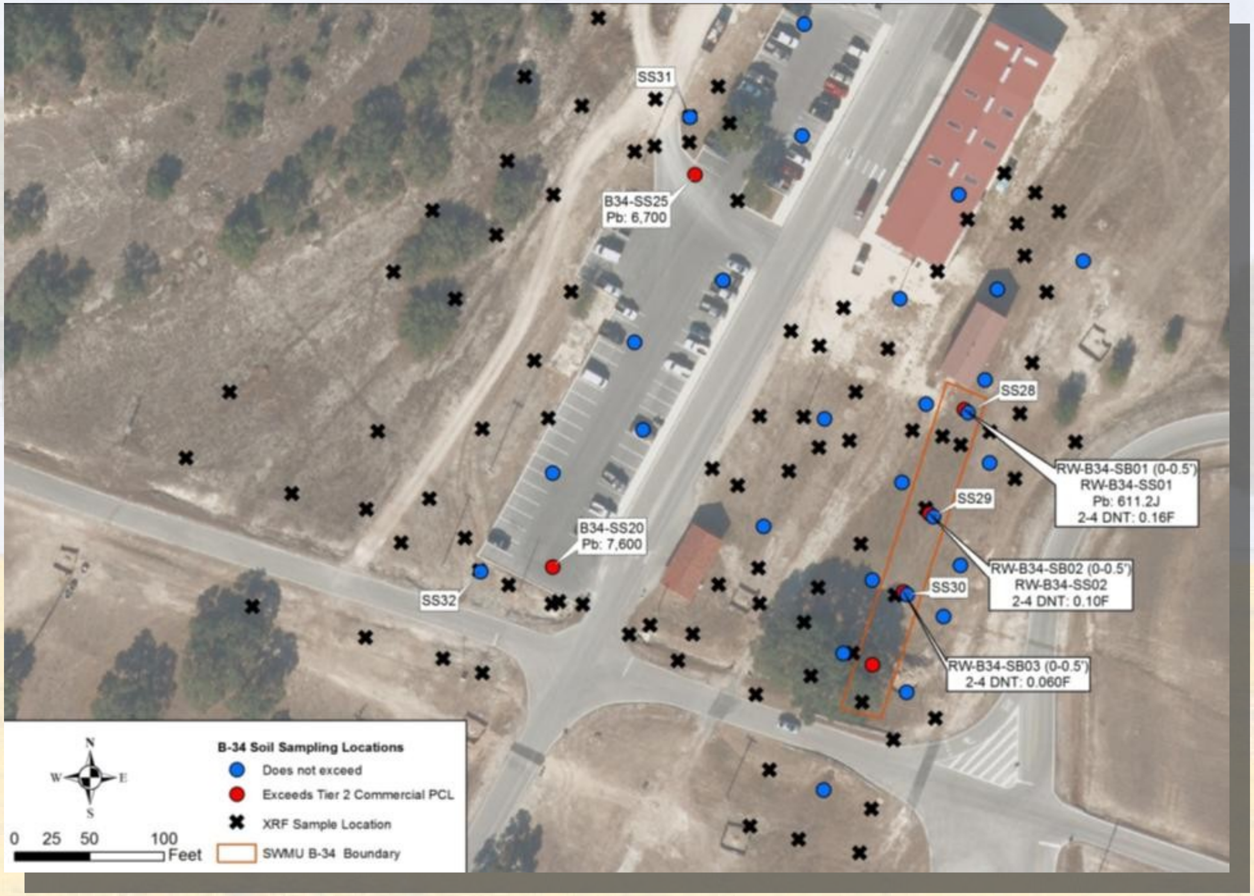

Approximate Map Location
Overview of CSSA

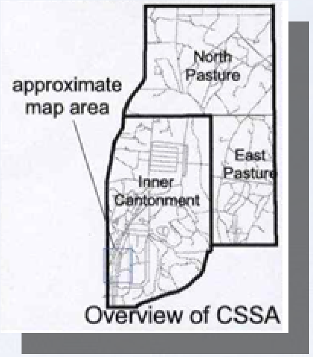

Approximate Map Location

Site Closure Updates

SWMU B-34

- Buried pipeline, 0.5 acres
- Investigation efforts to date:
  - geophysical survey, surface and subsurface sampling, and XRF analysis
  - Additional XRF samples to the west of parking area, January 2012
- Next steps:
  - Resample surface soil at SB01 - SB03
  - Submit APAR requesting NFA decision to TCEQ


SS31
B34-SS25
Pb: 6,700
B34-SS20
Pb: 7,600
SS32
SS28
RW-B34-SB01 (0-0.5')
RW-B34-SS01
Pb: 611.2J
2-4 DNT: 0.16F
SS29
RW-B34-SB02 (0-0.5')
RW-B34-SS02
2-4 DNT: 0.10F
SS30
RW-B34-SB03 (0-0.5')
2-4 DNT: 0.060F
N
W
E
S
0 25 50 100
Feet
B-34 Soil Sampling Locations
Does not exceed
Exceeds Tier 2 Commercial PCL
XRF Sample Location
SWMU B-34 Boundary


approximate map area
North Pasture
East Pasture
Inner Cantonment
Overview of CSSA

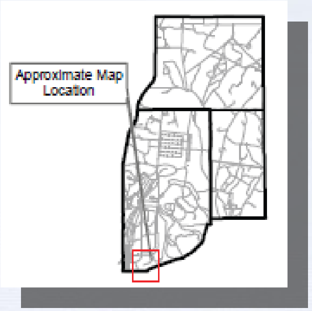
Site Closure Updates

AOC-65 (IRA)

- Interim Removal Actions (IRA) to date:
  - Initial IRA in 2001 removed ~ 1,300 CY of contaminated soils from surface areas west of Bldg. 90.
  - IRA in 2012 remove ~ 1,000 CY of contaminated limestone within the ditch area west of Bldg. 90. Trench measured ~ 310 ft x 3.5 ft x15 ft.

More detail provided in later slides

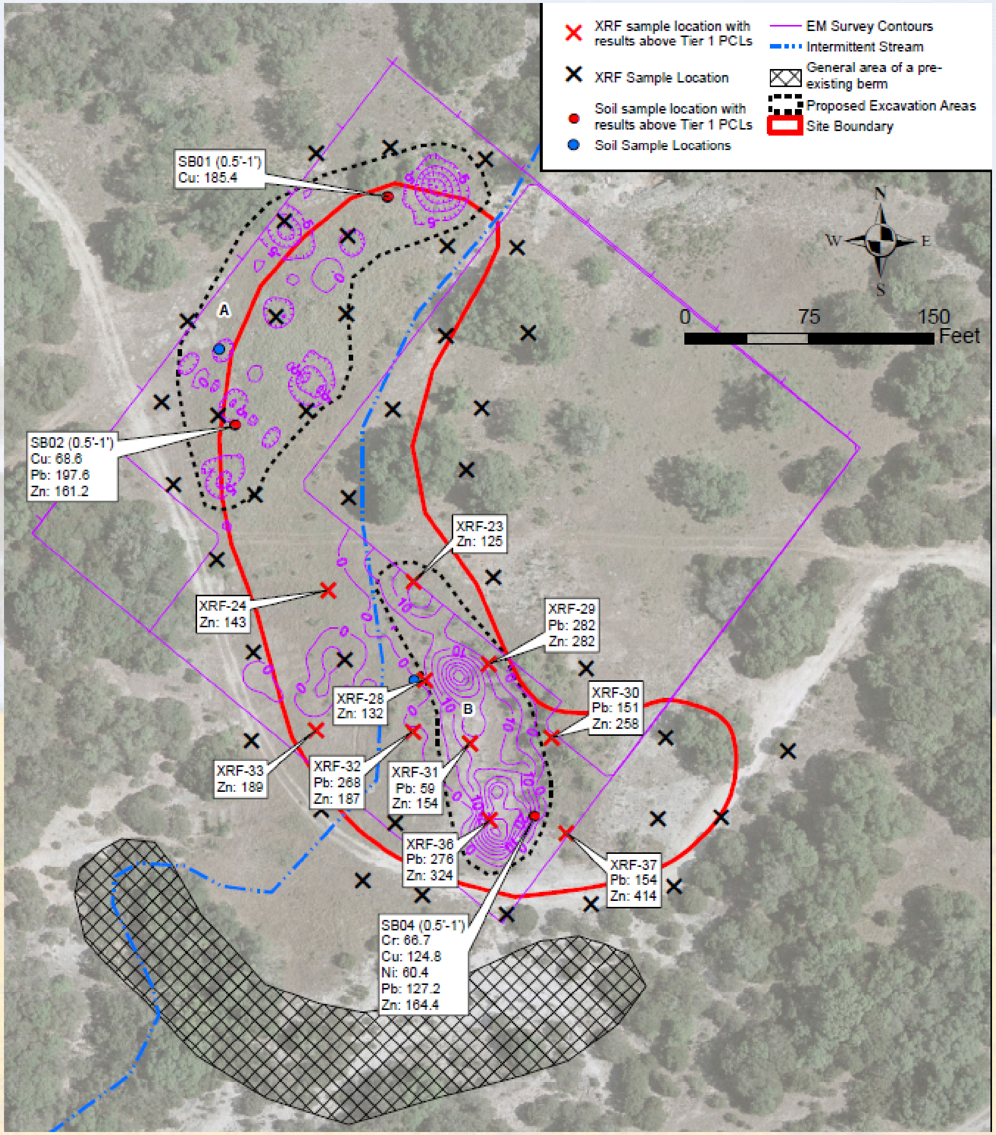
FIELD EFFORTS REMAINING

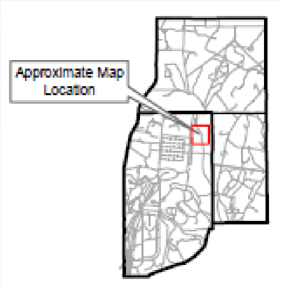

Approximate Map Location

Site Closure Updates

SWMU B-13

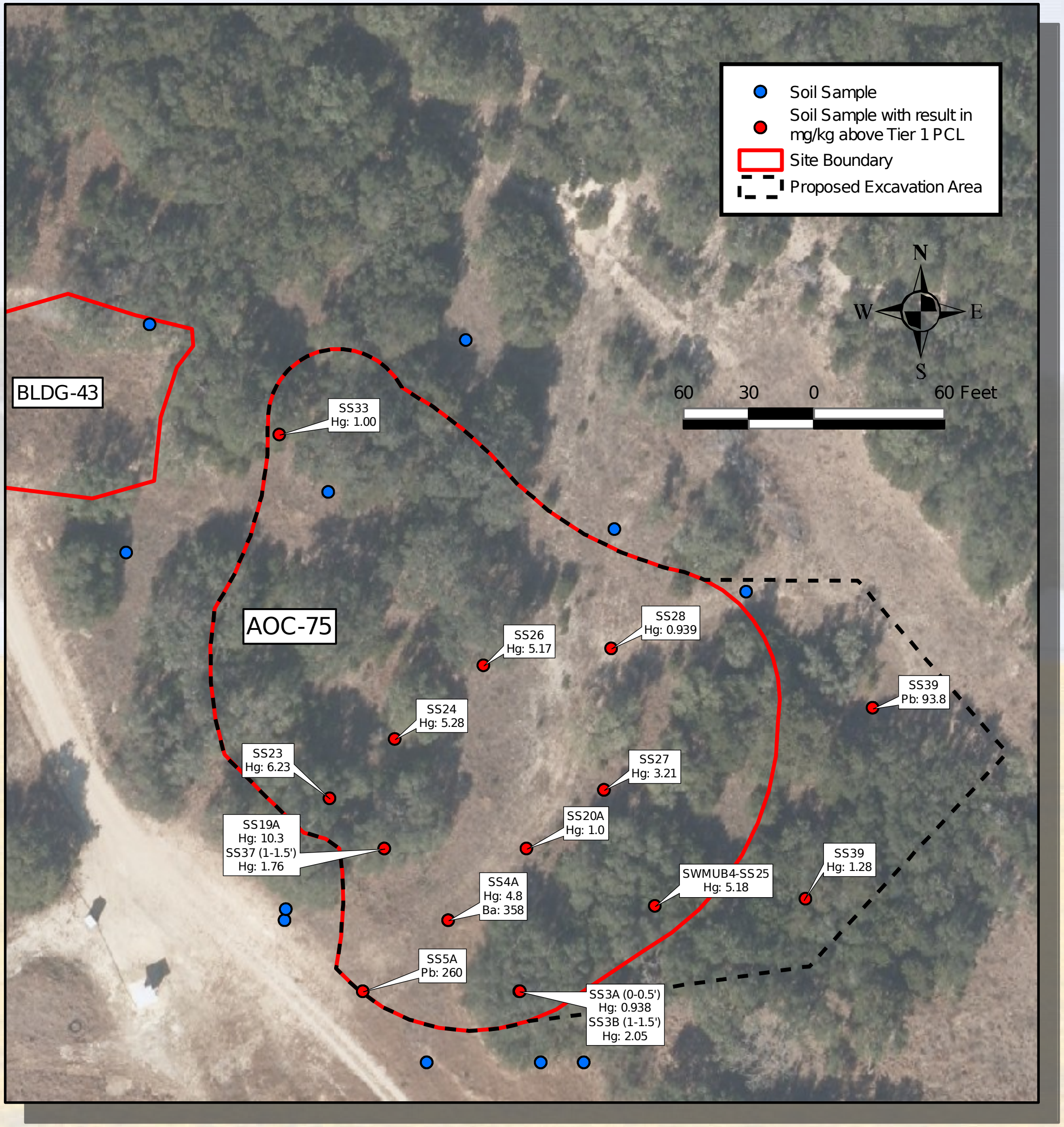
- Disposal area, 3 acres
- COCs: chromium, copper, lead, nickel, and zinc
- Investigation efforts to date:
  - Geophysical survey, surface and subsurface soil sampling, XRF analysis
- Next Steps (anticipate RIR closure in 2013):
  - Excavate contaminated soil and waste materials
  - Submit RIR requesting NFA decision to TCEQ.


XRF sample location with results above Tier 1 PCLs
XRF Sample Location
Soil sample location with results above Tier 1 PCLs
Soil Sample Locations
EM Survey Contours
Intermittent Stream
General area of a pre-existing berm
Proposed Excavation Areas
Site Boundary
N
S
E
W
0
75
150
Feet
A
B
SB01 (0.5'-1')
Cu: 185.4
SB02 (0.5'-1')
Cu: 68.6
Pb: 197.6
Zn: 161.2
XRF-23
Zn: 125
XRF-24
Zn: 143
XRF-29
Pb: 282
Zn: 282
XRF-28
Zn: 132
XRF-30
Pb: 151
Zn: 258
XRF-33
Zn: 189
XRF-32
Pb: 268
Zn: 187
XRF-31
Pb: 59
Zn: 154
XRF-36
Pb: 276
Zn: 324
XRF-37
Pb: 154
Zn: 414
SB04 (0.5'-1')
Cr: 66.7
Cu: 124.8
Ni: 60.4
Pb: 127.2
Zn: 164.4


Approximate Map Location

Site Closure Updates
AOC-75

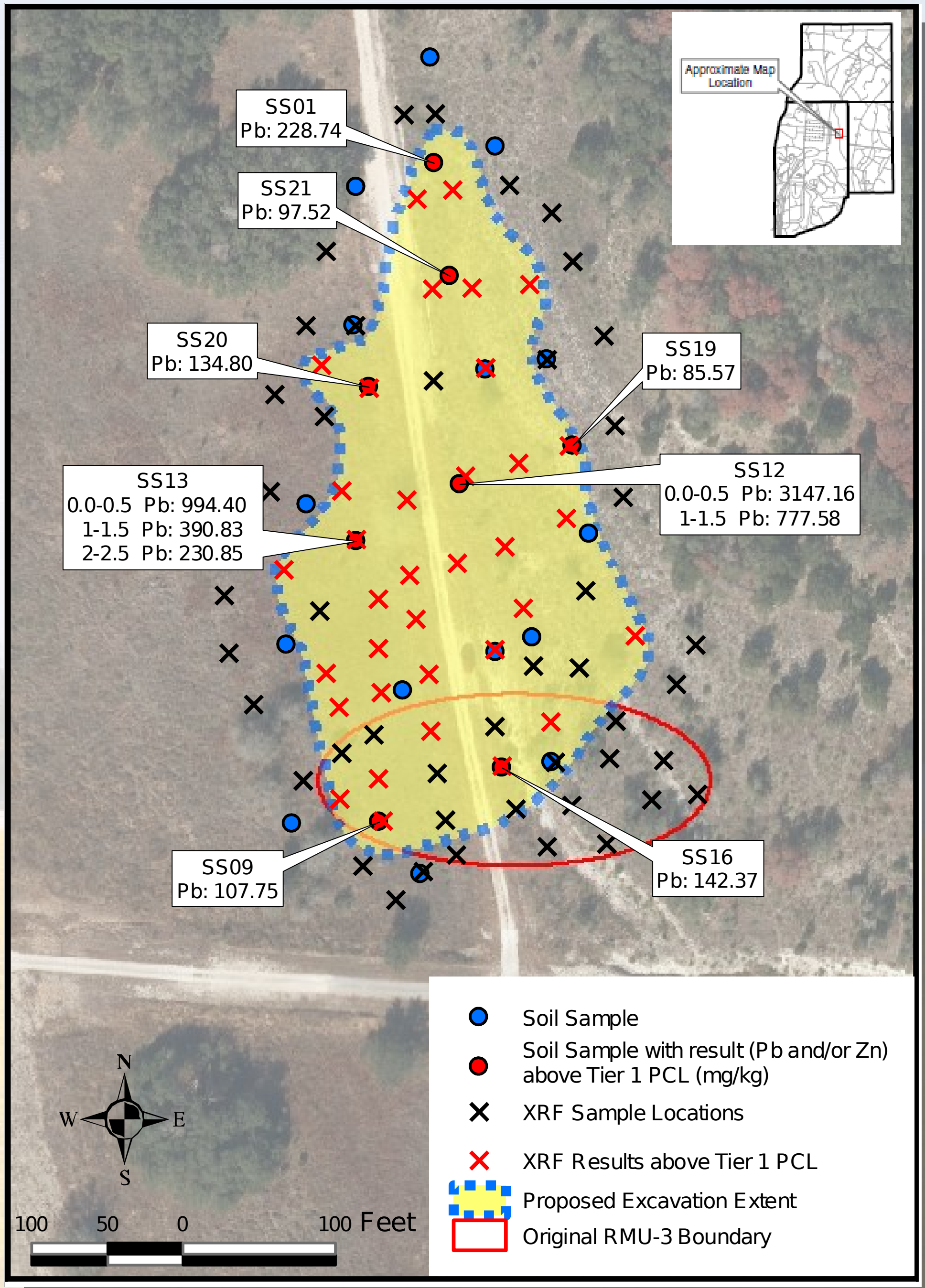
- Area with elevated mercury north of SWMU B-4, 1.2 acres
- Originally part of SWMU B-4
- COC: mercury
- Investigation efforts to date:
  - Surface and subsurface soil sampling
- Next steps (anticipate RIR closure in 2013):
  - Excavation of contaminated soil
  - Submit RIR to TCEQ requesting NFA decision.

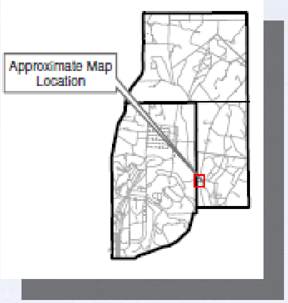

Soil Sample
Soil Sample with result in mg/kg above Tier 1 PCL
Site Boundary
Proposed Excavation Area
N
W
E
S
60
30
0
60 Feet
BLDG-43
AOC-75
SS33 Hg: 1.00
SS26 Hg: 5.17
SS28 Hg: 0.939
SS39 Pb: 93.8
SS24 Hg: 5.28
SS23 Hg: 6.23
SS27 Hg: 3.21
SS20A Hg: 1.0
SS19A Hg: 10.3 SS37 (1-1.5') Hg: 1.76
SS39 Hg: 1.28
SWMUB4-SS25 Hg: 5.18
SS4A Hg: 4.8 Ba: 358
SS5A Pb: 260
SS3A (0-0.5') Hg: 0.938 SS3B (1-1.5') Hg: 2.05

Site Closure Updates

RMU-3

- Rifle range, 0.5 acre
- COC: lead
- Investigation efforts to date:
  - XRF analysis, surface and subsurface soil sampling
- Next Steps (anticipate RIR closure in 2013):
  - Excavation of contaminated soil
  - Submit RIR to TCEQ requesting NFA decision.


Approximate Map Location
SS01 Pb: 228.74
SS21 Pb: 97.52
SS20 Pb: 134.80
SS19 Pb: 85.57
SS12 0.0-0.5 Pb: 3147.16 1-1.5 Pb: 777.58
SS13 0.0-0.5 Pb: 994.40 1-1.5 Pb: 390.83 2-2.5 Pb: 230.85
SS09 Pb: 107.75
SS16 Pb: 142.37
N
W
E
S
100
50
0
100 Feet
● Soil Sample
● Soil Sample with result (Pb and/or Zn) above Tier 1 PCL (mg/kg)
✕ XRF Sample Locations
✕ XRF Results above Tier 1 PCL
Proposed Excavation Extent
Original RMU-3 Boundary


Approximate Map Location

Site Closure Updates

RMU-4

- Small arms range abutment, 1.6 acres
- Concrete abutment (site 41BX1234) recommended to be considered ineligible for National Register nomination because integrity has been compromised (Phase I Archaeological Survey, April 1998)
- WWI zig-zag trenches (41BX1163/41BX1189) recommended to be considered eligible.

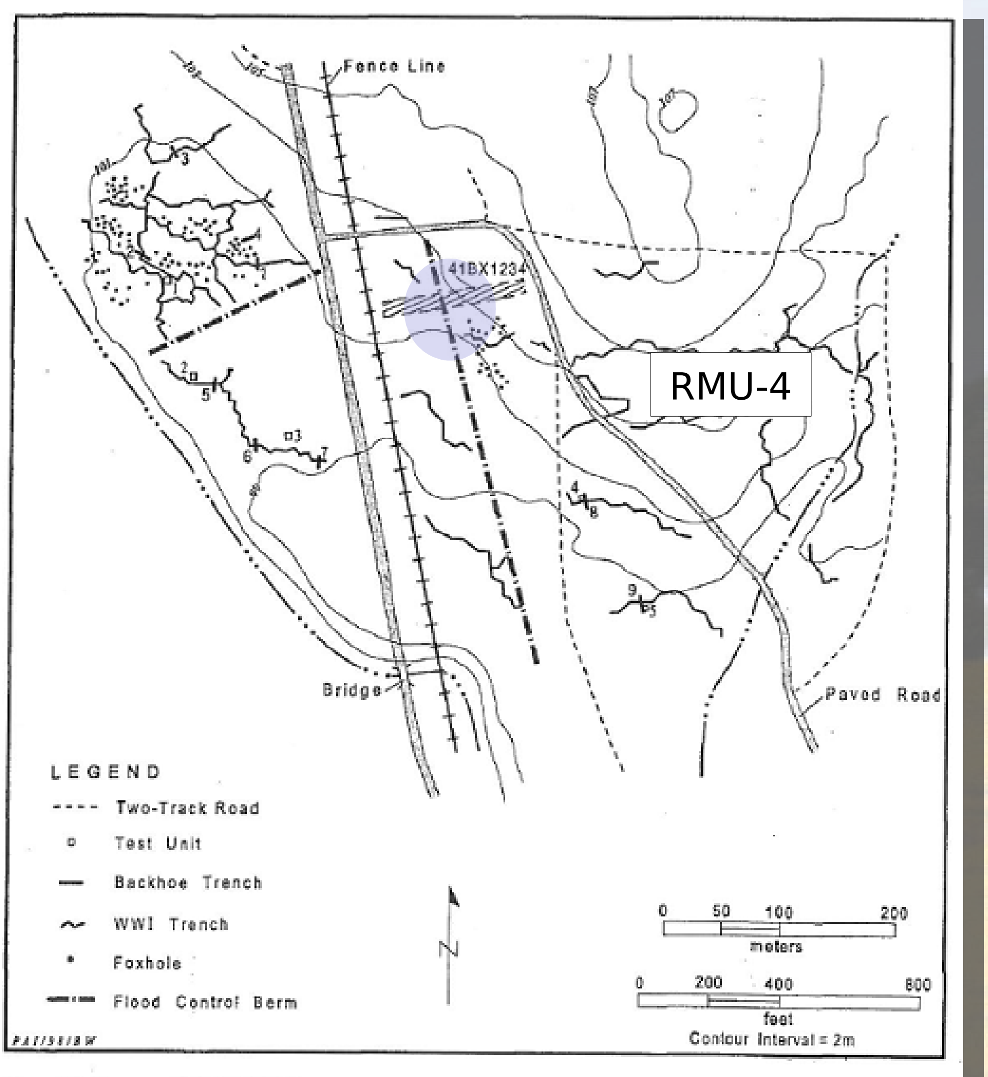
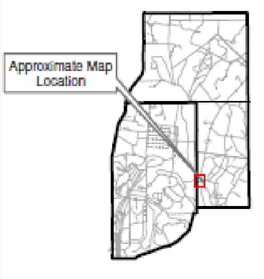

Fence Line
41BX1234
RMU-4
Bridge
Paved Road
LEGEND
Two-Track Road
Test Unit
Backhoe Trench
WWI Trench
Foxhole
Flood Control Berm
N
0 50 100 200
meters
0 200 400 800
feet
Contour Interval = 2m

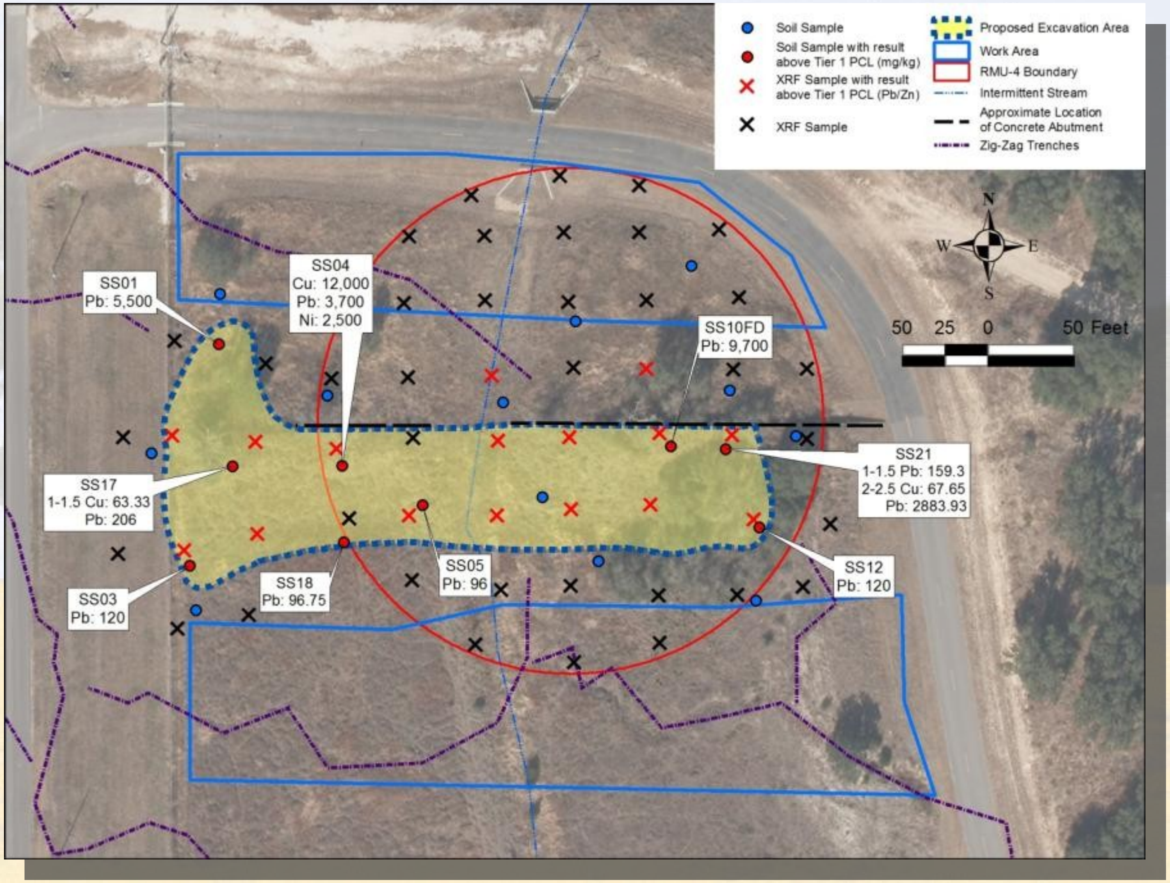
Figure 19. Site map of 41BX1163/1189.


Approximate Map Location

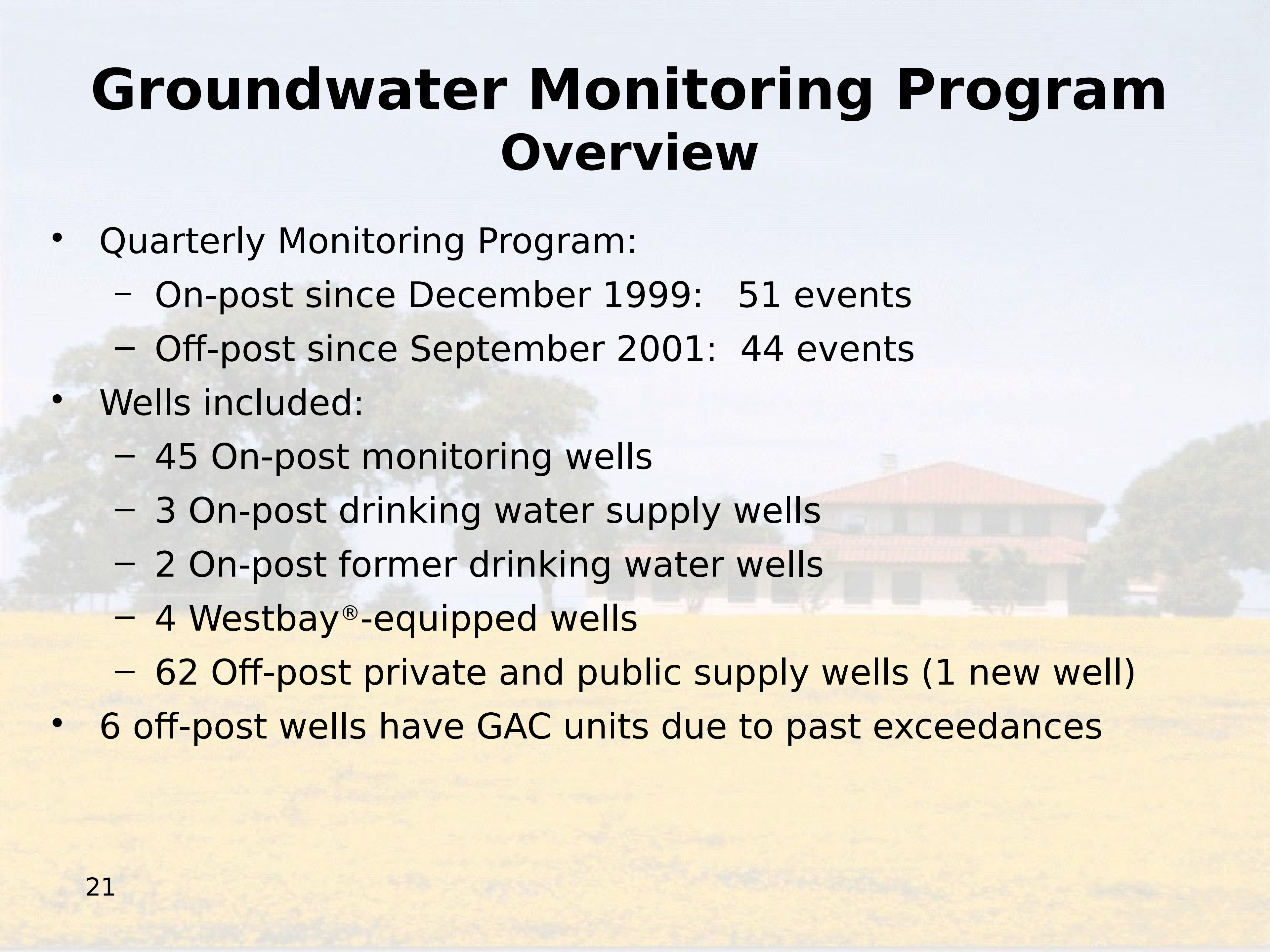
Site Closure Updates

RMU-4 (cont.)

- COC: copper, lead, and nickel
- Investigation efforts to date: XRF survey, soil sampling
- Next steps (anticipate closure in 2013):
  - Excavation of contaminated soil
  - Submit RIR to TCEQ requesting NFA decision.


● Soil Sample
● Soil Sample with result above Tier 1 PCL (mg/kg)
× XRF Sample with result above Tier 1 PCL (Pb/Zn)
× XRF Sample
Proposed Excavation Area
Work Area
RMU-4 Boundary
Intermittent Stream
Approximate Location of Concrete Abutment
Zig-Zag Trenches
N
W
E
S
50 25 0 50 Feet
SS01
Pb: 5,500
SS04
Cu: 12,000
Pb: 3,700
Ni: 2,500
SS10FD
Pb: 9,700
SS21
1-1.5 Pb: 159.3
2-2.5 Cu: 67.65
Pb: 2883.93
SS17
1-1.5 Cu: 63.33
Pb: 206
SS05
Pb: 96
SS12
Pb: 120
SS18
Pb: 96.75
SS03
Pb: 120

GROUNDWATER UPDATE



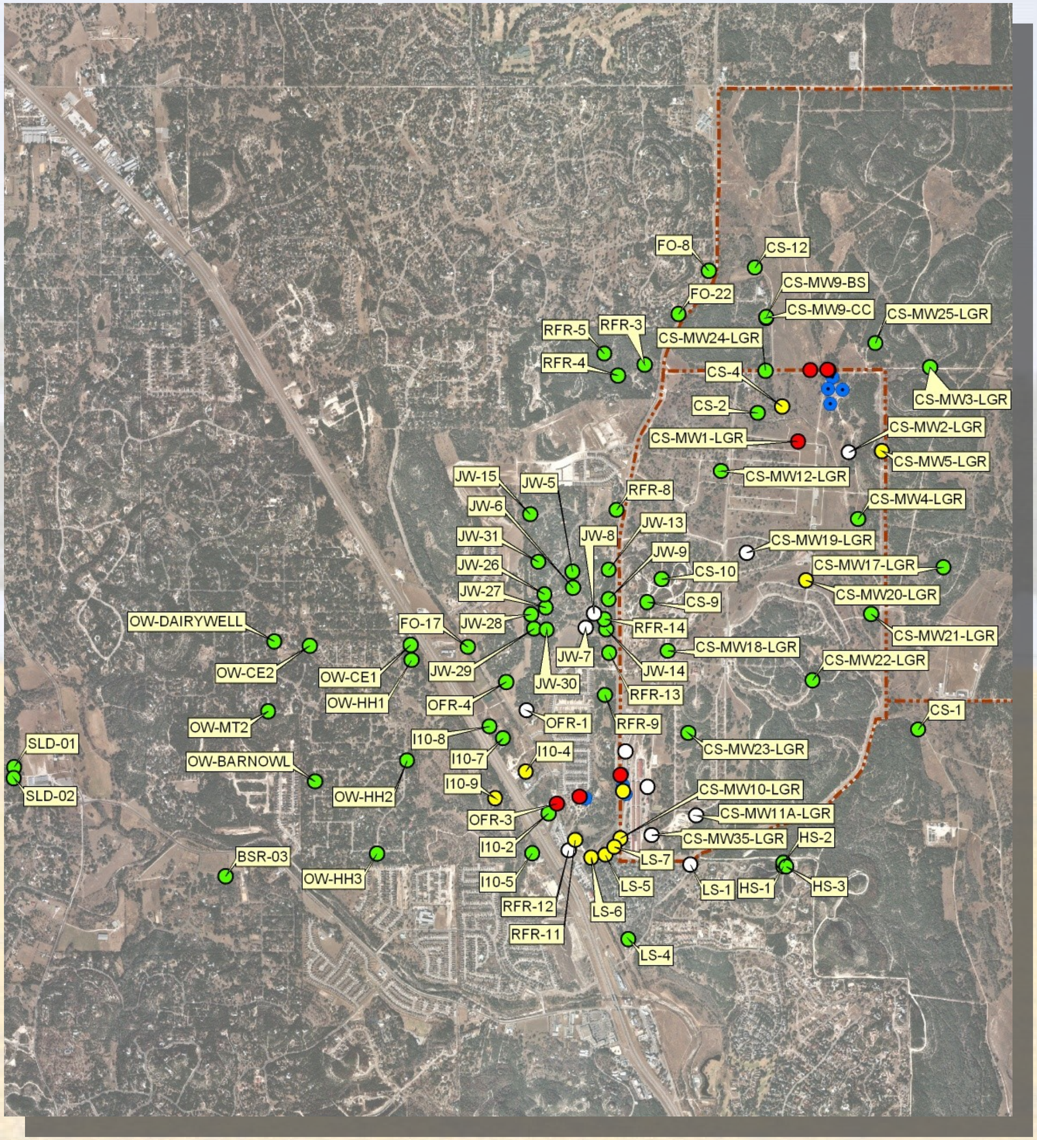
Groundwater Monitoring Program
Overview

- Quarterly Monitoring Program:
  - On-post since December 1999: 51 events
  - Off-post since September 2001: 44 events
- Wells included:
  - 45 On-post monitoring wells
  - 3 On-post drinking water supply wells
  - 2 On-post former drinking water wells
  - 4 Westbay®-equipped wells
  - 62 Off-post private and public supply wells (1 new well)
- 6 off-post wells have GAC units due to past exceedances

Groundwater Monitoring Program

Sampling Locations

- 11+ yrs of quarterly off-post monitoring.
- 13+ yrs of quarterly on-post monitoring.
- Sampling locations vary quarterly per DQOs and LTMO.


FO-8
CS-12
CS-MW9-BS
FO-22
CS-MW9-CC
CS-MW25-LGR
RFR-5
RFR-3
CS-MW24-LGR
RFR-4
CS-4
CS-MW3-LGR
CS-2
CS-MW2-LGR
CS-MW1-LGR
CS-MW5-LGR
JW-15
JW-5
CS-MW12-LGR
RFR-8
JW-6
CS-MW4-LGR
JW-13
JW-31
JW-8
CS-MW19-LGR
JW-9
JW-26
CS-10
CS-MW17-LGR
JW-27
CS-9
CS-MW20-LGR
OW-DAIRYWELL
FO-17
JW-28
RFR-14
CS-MW21-LGR
CS-MW18-LGR
JW-7
OW-CE2
OW-CE1
JW-29
JW-14
CS-MW22-LGR
OW-HH1
JW-30
OFR-4
RFR-13
OW-MT2
OFR-1
RFR-9
CS-1
I10-8
SLD-01
I10-4
CS-MW23-LGR
OW-BARNOWL
I10-7
SLD-02
OW-HH2
I10-9
CS-MW10-LGR
OFR-3
CS-MW11A-LGR
I10-2
CS-MW35-LGR
HS-2
BSR-03
LS-7
OW-HH3
I10-5
LS-5
LS-1
HS-1
HS-3
RFR-12
LS-6
RFR-11
LS-4

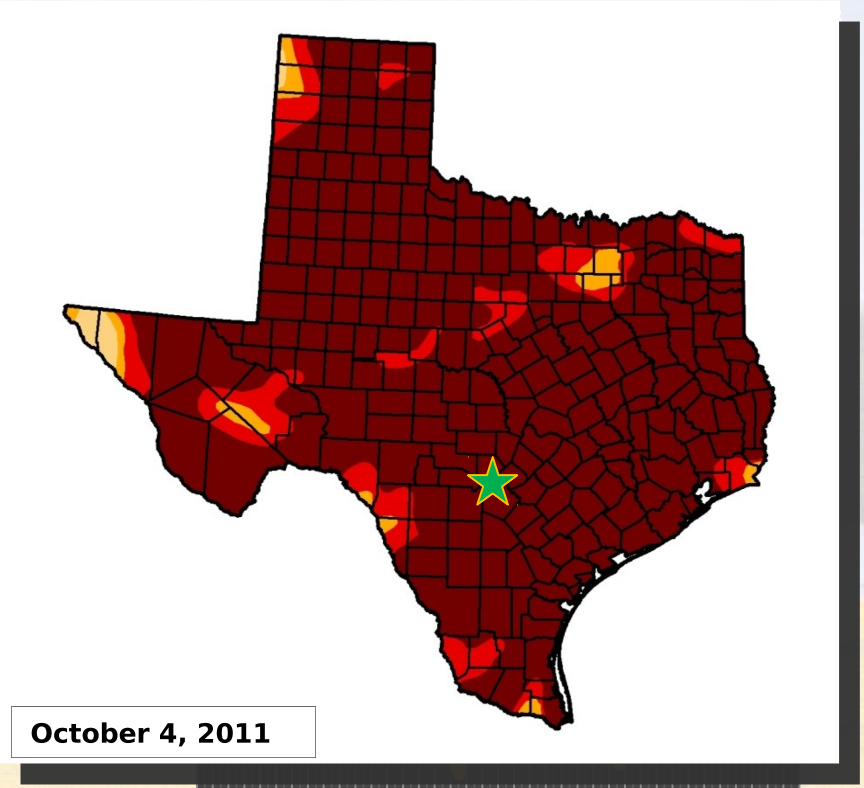
Groundwater Monitoring Program
Recent Changes

- Central Texas was experiencing an *“exceptional”* drought until October 2011 when 12.3 inches occurred in the last 3 months of 2011.

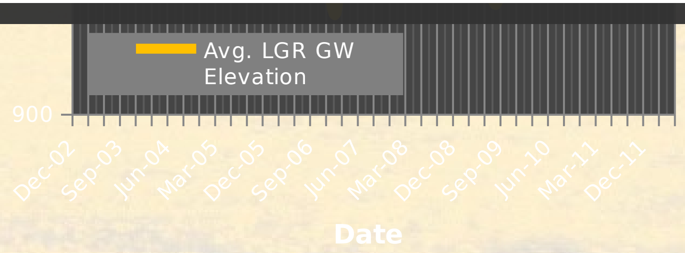
- Rainfall continued through May 2012, with CSSA receiving 13.97” in the first 5 months of the year, reducing drought stage to *“moderate”*.

- Aquifer levels rebounded more than 66 feet by March, but have since declined ~ 45 feet by June. Aquifer level still “below average”.

- Note that the average aquifer elevation “bottoms out” near the top of the LGR production zone during droughts.



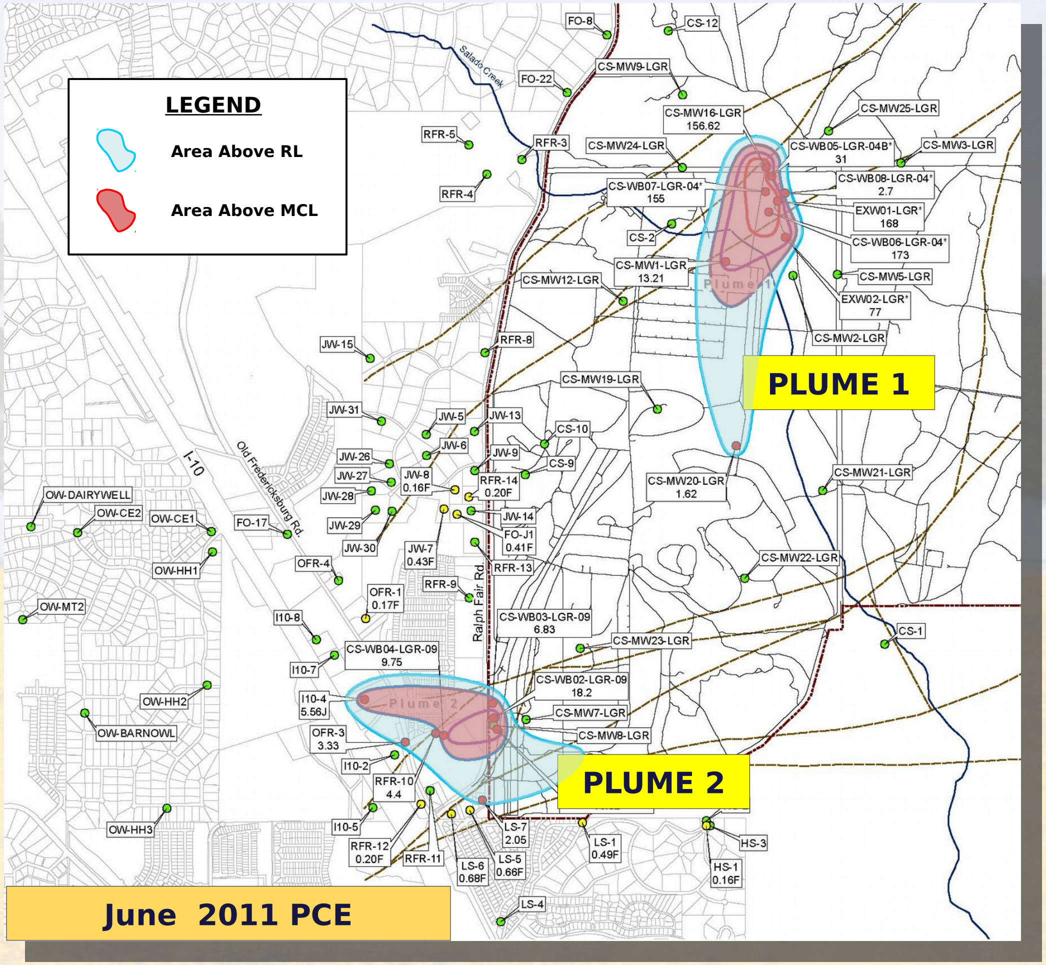
October 4, 2011



Groundwater Monitoring Program

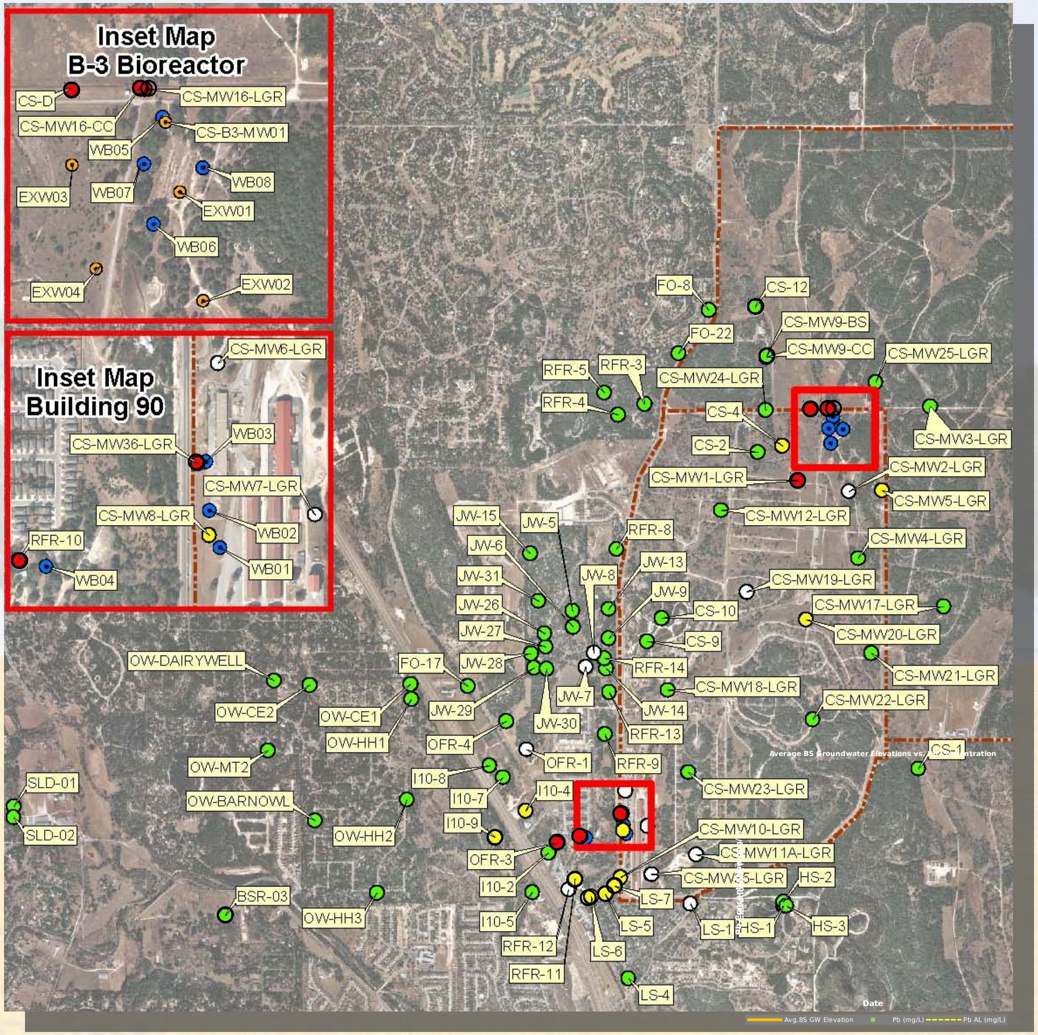
General Facts

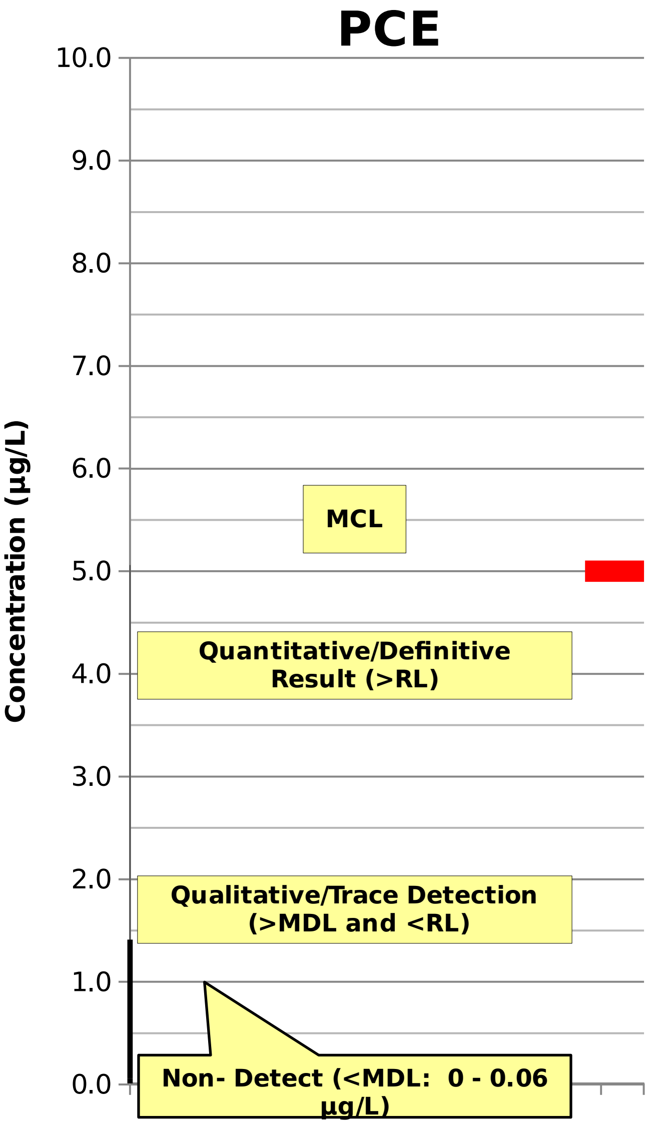
- **Plume 1** originates from SWMUs B-3 and O-1 in the Inner Cantonment.
- **Plume 2** originates from AOC-65 in the SW corner of CSSA.
- Concern about increasing trend at I10-4 west of CSSA (Plume 2) prompted additional sampling locations west of IH-10 (12 new wells since March 2011).
- The new DQOs and LTMO program (approved in 2010) went into effect in June 2011.
- March 2012 was a **"snapshot"** event (all LGR and off-post wells sampled).
- December 2012 will be the next **snapshot** event.

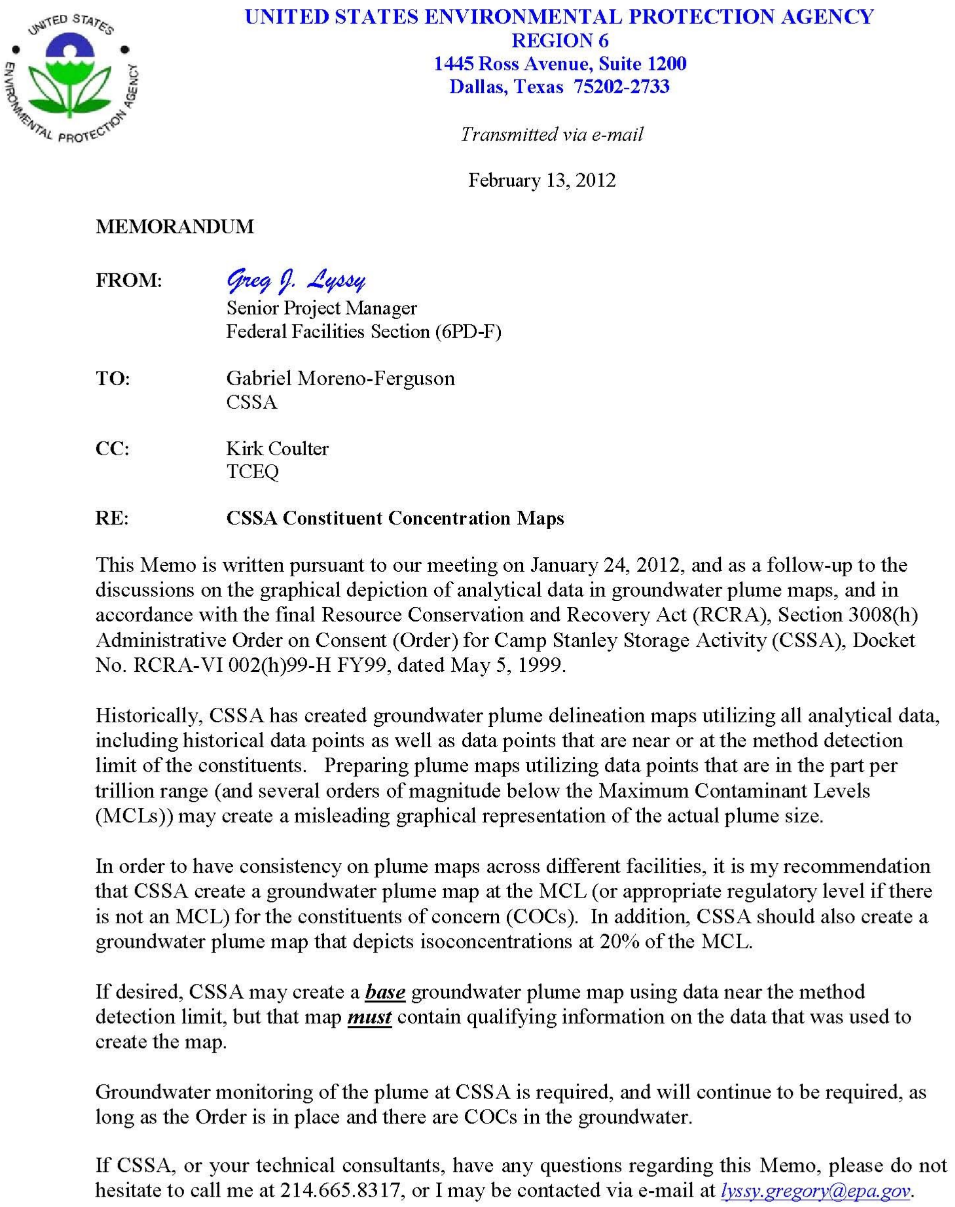

LEGEND
Area Above RL
Area Above MCL
PLUME 1
PLUME 2
Plume 1
Plume 2
June 2011 PCE
Salado Creek
I-10
Old Fredericksburg Rd.
Ralph Fair Rd.
FO-8
CS-12
FO-22
CS-MW9-LGR
CS-MW16-LGR 156.62
CS-MW25-LGR
RFR-5
RFR-3
CS-MW24-LGR
CS-WB05-LGR-04B* 31
CS-MW3-LGR
RFR-4
CS-WB07-LGR-04* 155
CS-WB08-LGR-04* 2.7
EXW01-LGR* 168
CS-2
CS-WB06-LGR-04* 173
CS-MW1-LGR 13.21
CS-MW12-LGR
CS-MW5-LGR
EXW02-LGR* 77
CS-MW2-LGR
JW-15
RFR-8
CS-MW19-LGR
JW-31
JW-5
JW-13
CS-10
JW-6
JW-9
CS-9
JW-26
JW-27
JW-8 0.16F
RFR-14 0.20F
CS-MW20-LGR 1.62
CS-MW21-LGR
JW-28
OW-DAIRYWELL
OW-CE2
OW-CE1
FO-17
JW-29
JW-14
FO-J1 0.41F
JW-30
JW-7 0.43F
OW-HH1
OFR-4
RFR-13
RFR-9
CS-MW22-LGR
OW-MT2
OFR-1 0.17F
I10-8
CS-WB03-LGR-09 6.83
CS-MW23-LGR
CS-1
I10-7
CS-WB04-LGR-09 9.75
CS-WB02-LGR-09 18.2
OW-HH2
I10-4 5.56J
CS-MW7-LGR
OW-BARNOWL
OFR-3 3.33
CS-MW8-LGR
I10-2
RFR-10 4.4
OW-HH3
I10-5
LS-7 2.05
LS-1 0.49F
HS-3
RFR-12 0.20F
RFR-11
LS-6 0.68F
LS-5 0.66F
HS-1 0.16F
LS-4

Groundwater Monitoring Program
March 2012 Results Overview

- “Snapshot” event included 33 On-post and 55 Off-post wells. 1 On-Post well that was scheduled for sampling could not be sampled due to depressed water levels (water level below pump).
  - New supply well CS-12 continues to be free of VOCs. All metals were below ALs, MCLs, SCLs.
  - Five on-post wells continue to exceed the MCL for either PCE, TCE, or *cis*-1,2-DCE.
  - On-post well CS-MW9-BS slightly exceeded the AL (0.015 mg/L) for lead with a concentration of 0.016 mg/L.
  - Off-post well I10-9 was above the RL, but less than MCL for TCE for the third quarter in a row.
  - A new well, BSR-03, was added to the program. No VOCs were detected in that well.
  - Semi-annual GAC maintenance, including a carbon exchange, took place in January 2012. The next GAC maintenance, with carbon exchange, scheduled for July 2012.


Inset Map
B-3 Bioreactor
CS-D
CS-MW16-LGR
CS-MW16-CC
CS-B3-MW01
WB05
WB08
EXW03
WB07
EXW01
WB06
EXW04
EXW02
Inset Map
Building 90
CS-MW6-LGR
WB03
CS-MW36-LGR
CS-MW7-LGR
CS-MW8-LGR
WB02
RFR-10
WB01
WB04
FO-8
CS-12
FO-22
CS-MW9-BS
CS-MW9-CC
CS-MW25-LGR
RFR-5
RFR-3
CS-MW24-LGR
RFR-4
CS-4
CS-MW3-LGR
CS-2
CS-MW1-LGR
CS-MW2-LGR
CS-MW5-LGR
JW-15
JW-5
CS-MW12-LGR
RFR-8
CS-MW4-LGR
JW-6
JW-13
JW-31
JW-8
CS-MW19-LGR
JW-9
JW-26
CS-10
CS-MW17-LGR
JW-27
CS-9
CS-MW20-LGR
OW-DAIRYWELL
FO-17
JW-28
RFR-14
CS-MW21-LGR
CS-MW18-LGR
JW-7
CS-MW22-LGR
OW-CE2
OW-CE1
JW-29
JW-30
JW-14
OW-HH1
RFR-13
OFR-4
CS-1
OW-MT2
OFR-1
RFR-9
SLD-01
I10-8
I10-4
CS-MW23-LGR
OW-BARNOWL
I10-7
SLD-02
I10-9
OW-HH2
CS-MW10-LGR
OFR-3
CS-MW11A-LGR
CS-MW35-LGR
HS-2
I10-2
BSR-03
LS-7
OW-HH3
I10-5
LS-5
LS-1
HS-1
HS-3
RFR-12
LS-6
RFR-11
LS-4
Average BS Groundwater Elevations vs. Pb Concentration
Date
Avg.BS GW Elevation
Pb (mg/L)
Pb AL (mg/L)





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Transmitted via e-mail

February 13, 2012

MEMORANDUM

FROM: *Greg J. Lyssy*
Senior Project Manager
Federal Facilities Section (6PD-F)

TO: Gabriel Moreno-Ferguson
CSSA

CC: Kirk Coulter
TCEQ

RE: **CSSA Constituent Concentration Maps**

This Memo is written pursuant to our meeting on January 24, 2012, and as a follow-up to the discussions on the graphical depiction of analytical data in groundwater plume maps, and in accordance with the final Resource Conservation and Recovery Act (RCRA), Section 3008(h) Administrative Order on Consent (Order) for Camp Stanley Storage Activity (CSSA), Docket No. RCRA-VI 002(h)99-H FY99, dated May 5, 1999.

Historically, CSSA has created groundwater plume delineation maps utilizing all analytical data, including historical data points as well as data points that are near or at the method detection limit of the constituents. Preparing plume maps utilizing data points that are in the part per trillion range (and several orders of magnitude below the Maximum Contaminant Levels (MCLs)) may create a misleading graphical representation of the actual plume size.

In order to have consistency on plume maps across different facilities, it is my recommendation that CSSA create a groundwater plume map at the MCL (or appropriate regulatory level if there is not an MCL) for the constituents of concern (COCs). In addition, CSSA should also create a groundwater plume map that depicts isoconcentrations at 20% of the MCL.

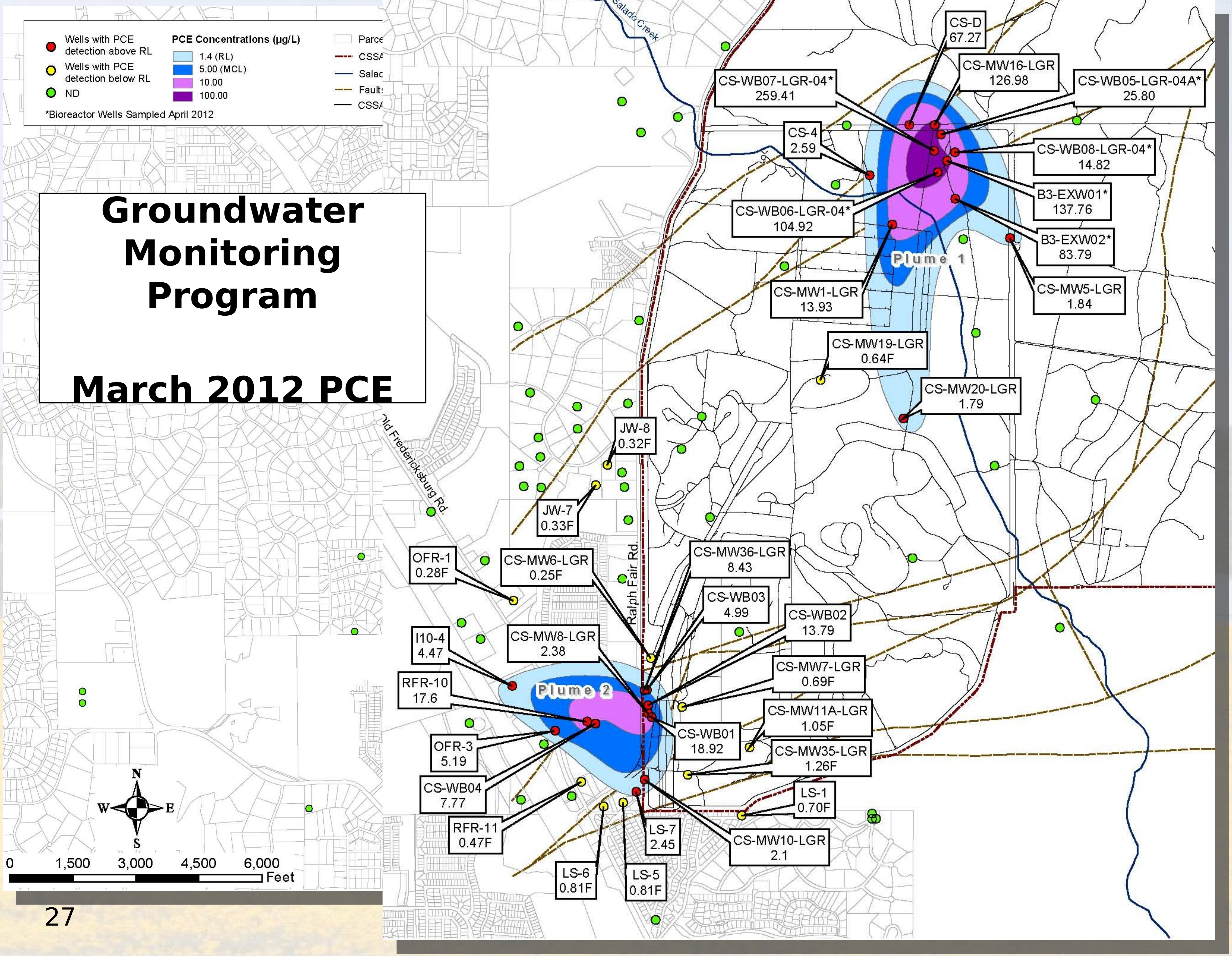
If desired, CSSA may create a ***base*** groundwater plume map using data near the method detection limit, but that map ***must*** contain qualifying information on the data that was used to create the map.

Groundwater monitoring of the plume at CSSA is required, and will continue to be required, as long as the Order is in place and there are COCs in the groundwater.

If CSSA, or your technical consultants, have any questions regarding this Memo, please do not hesitate to call me at 214.665.8317, or I may be contacted via e-mail at *lyssy.gregory@epa.gov*.

Groundwater Monitoring Program

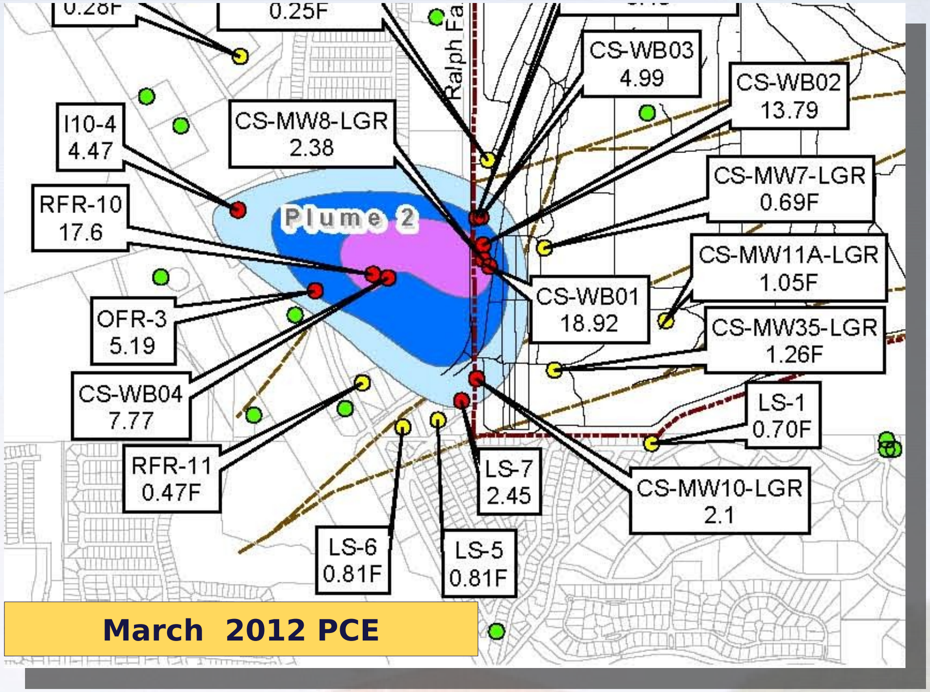
March 2012 PCE


Wells with PCE detection above RL
Wells with PCE detection below RL
ND
*Bioreactor Wells Sampled April 2012
PCE Concentrations (µg/L)
1.4 (RL)
5.00 (MCL)
10.00
100.00
Parce
CSSA
Salac
Fault
CSSA
Salado Creek
CS-D 67.27
CS-MW16-LGR 126.98
CS-WB07-LGR-04* 259.41
CS-WB05-LGR-04A* 25.80
CS-4 2.59
CS-WB08-LGR-04* 14.82
CS-WB06-LGR-04* 104.92
B3-EXW01* 137.76
B3-EXW02* 83.79
Plume 1
CS-MW1-LGR 13.93
CS-MW5-LGR 1.84
CS-MW19-LGR 0.64F
CS-MW20-LGR 1.79
Old Fredericksburg Rd.
JW-8 0.32F
JW-7 0.33F
Ralph Fair Rd.
OFR-1 0.28F
CS-MW6-LGR 0.25F
CS-MW36-LGR 8.43
CS-WB03 4.99
CS-WB02 13.79
CS-MW8-LGR 2.38
I10-4 4.47
CS-MW7-LGR 0.69F
RFR-10 17.6
Plume 2
CS-MW11A-LGR 1.05F
CS-WB01 18.92
OFR-3 5.19
CS-MW35-LGR 1.26F
CS-WB04 7.77
LS-1 0.70F
RFR-11 0.47F
LS-7 2.45
CS-MW10-LGR 2.1
LS-6 0.81F
LS-5 0.81F
N
W
E
S
0
1,500
3,000
4,500
6,000
Feet

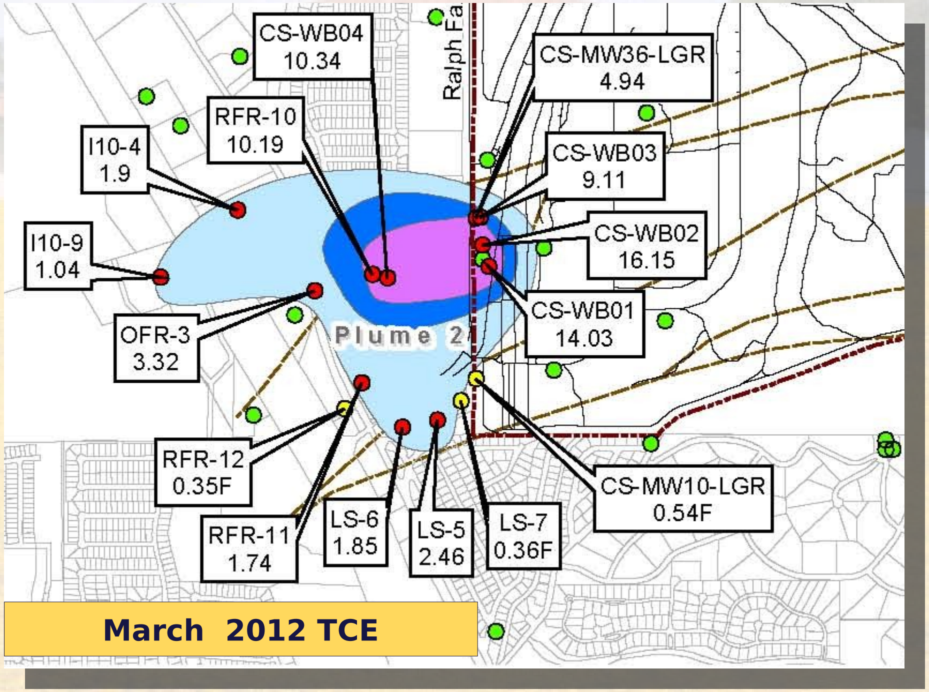
Groundwater Monitoring Program

Plume 2 Results

- PCE has not been reported west of Interstate Highway 10 since its initial trace detection in March 2011
- TCE has been reported west of Interstate Highway 10 at well I10-9 since September 2011
  - September 2011: 0.57F µg/L
  - December 2011: 1.29 µg/L
  - March 2012: 1.04 µg/L


0.28F
0.25F
Ralph Fa
CS-WB03
4.99
CS-WB02
13.79
I10-4
4.47
CS-MW8-LGR
2.38
CS-MW7-LGR
0.69F
RFR-10
17.6
Plume 2
CS-MW11A-LGR
1.05F
OFR-3
5.19
CS-WB01
18.92
CS-MW35-LGR
1.26F
CS-WB04
7.77
LS-1
0.70F
RFR-11
0.47F
LS-7
2.45
CS-MW10-LGR
2.1
LS-6
0.81F
LS-5
0.81F

March 2012 PCE


CS-WB04
10.34
Ralph Fa
CS-MW36-LGR
4.94
RFR-10
10.19
I10-4
1.9
CS-WB03
9.11
I10-9
1.04
CS-WB02
16.15
CS-WB01
14.03
OFR-3
3.32
Plume 2
RFR-12
0.35F
CS-MW10-LGR
0.54F
RFR-11
1.74
LS-6
1.85
LS-5
2.46
LS-7
0.36F

March 2012 TCE

Groundwater Monitoring Program

June 2012 Overview

- In accordance with the LTMO schedule, 17 samples were collected between June 4-14, 2012.
  - 11 Off-post wells
  - 6 On-post wells
- Validated results will be available in mid-July.

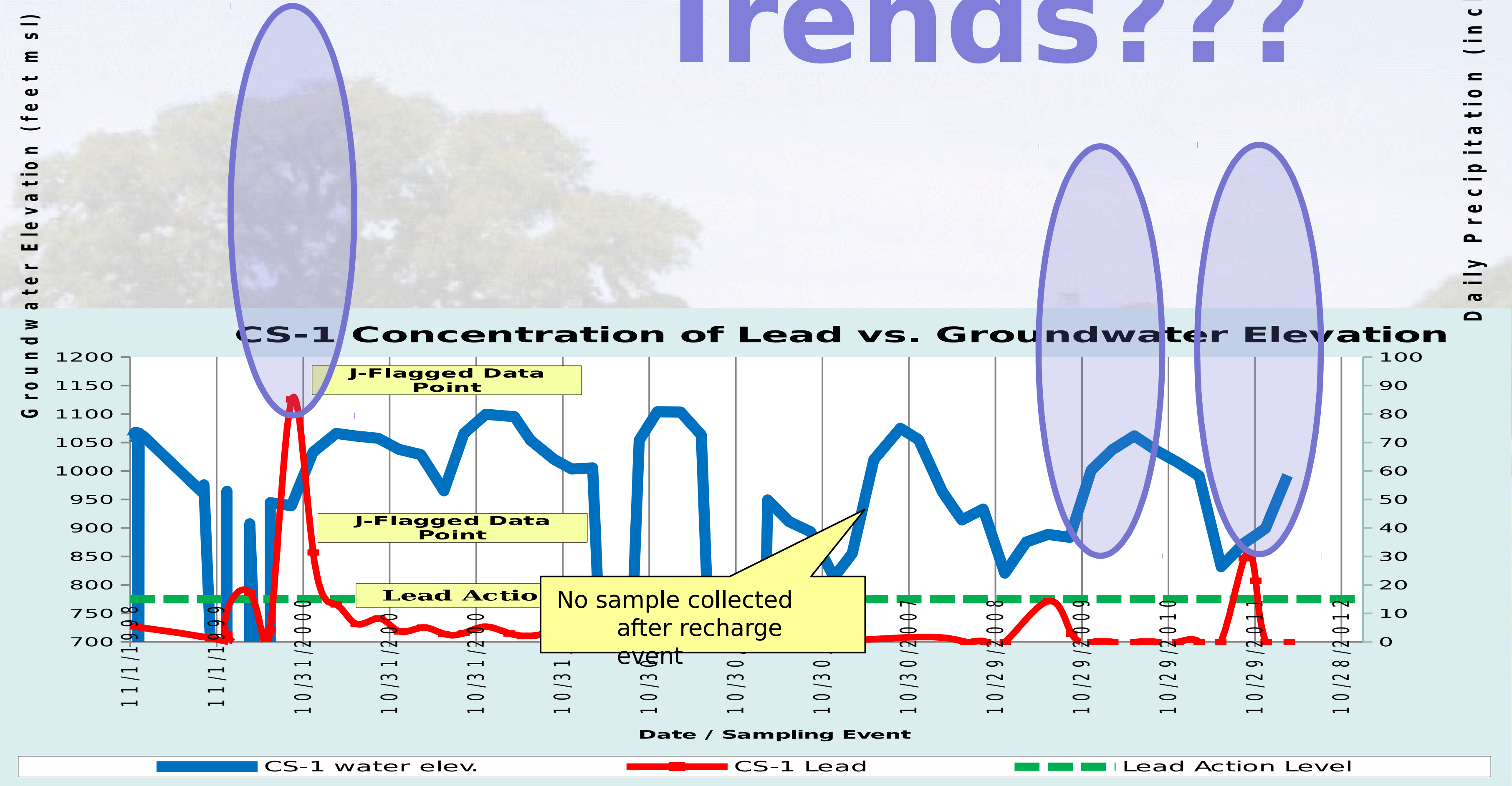
Supply Well CS-1

Detections of Lead

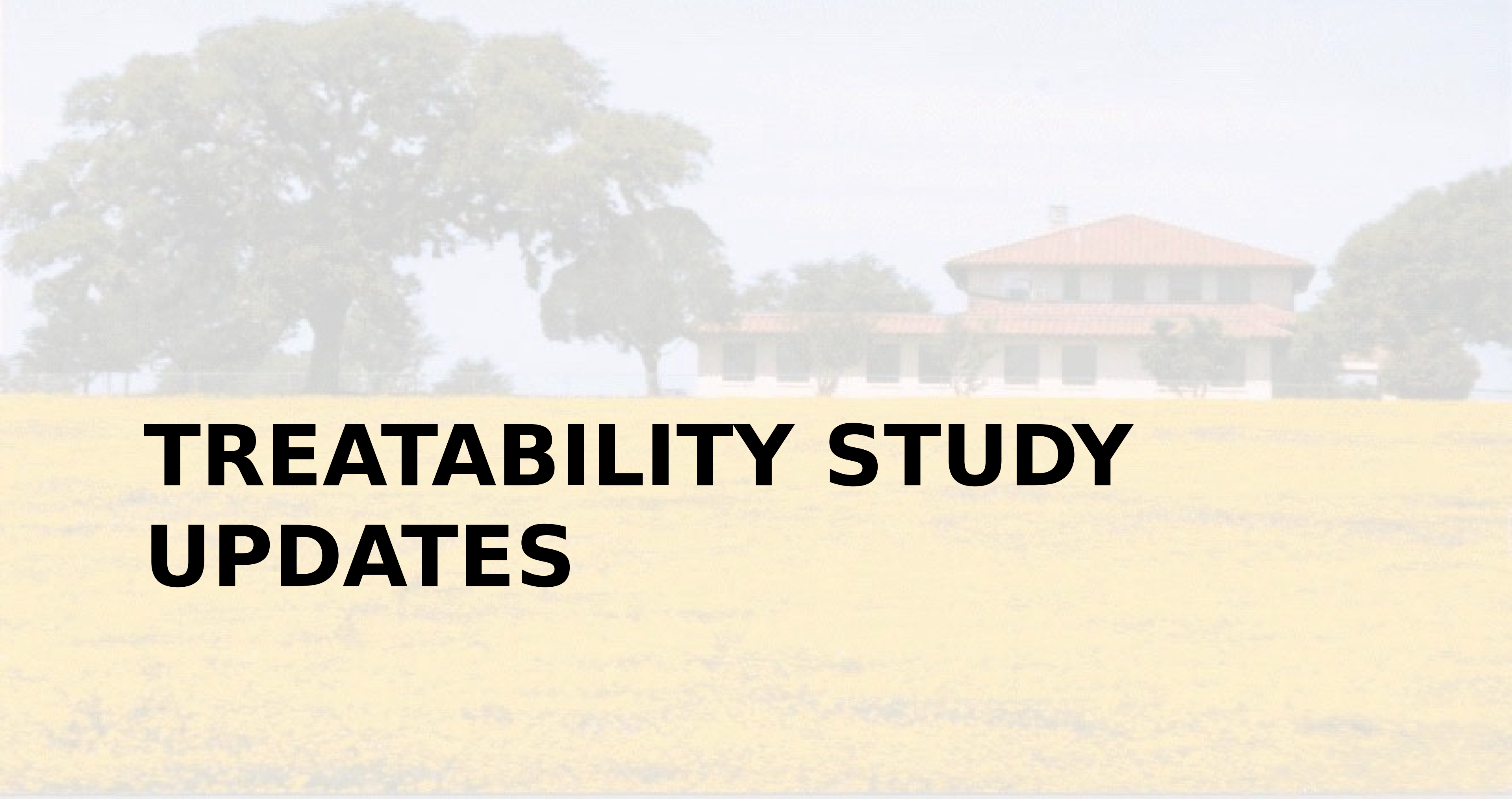
- Samples collected in September 2011 indicated Lead above the AL at 0.0294 mg/L. A November 2011 re-sample at 0.0214 mg/L confirmed the result.
- The subsequent quarterly event in December 2011 was below the AL at 0.0073F mg/L.
- March 2012 sampling resulted in a “Non-Detect” for lead.
- Trend may indicate that lead is temporarily present in the well after significant recharge events.

Supply Well CS-1

Trends???



No sample collected after recharge event

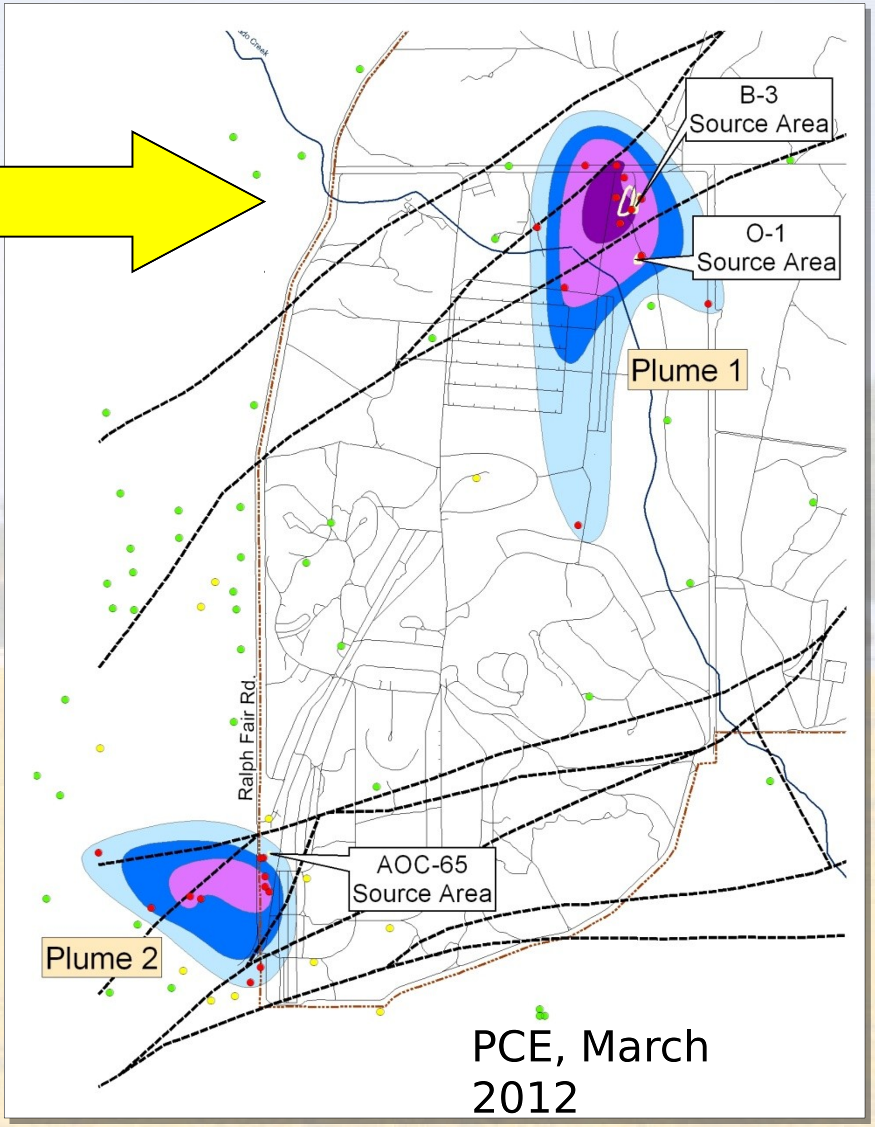


TREATABILITY STUDY UPDATES

SWMU B-3 and AOC-65
Description

1. **SWMU B-3 Bioreactor:** Enhanced anaerobic bioremediation of chlorinated hydrocarbons in underlying fractured limestone at Plume 1.

2. **AOC-65 Soil Vapor Extraction and Interim Removal Action:** Removal of chlorinated hydrocarbons in underlying fractured limestone at Plume 2.

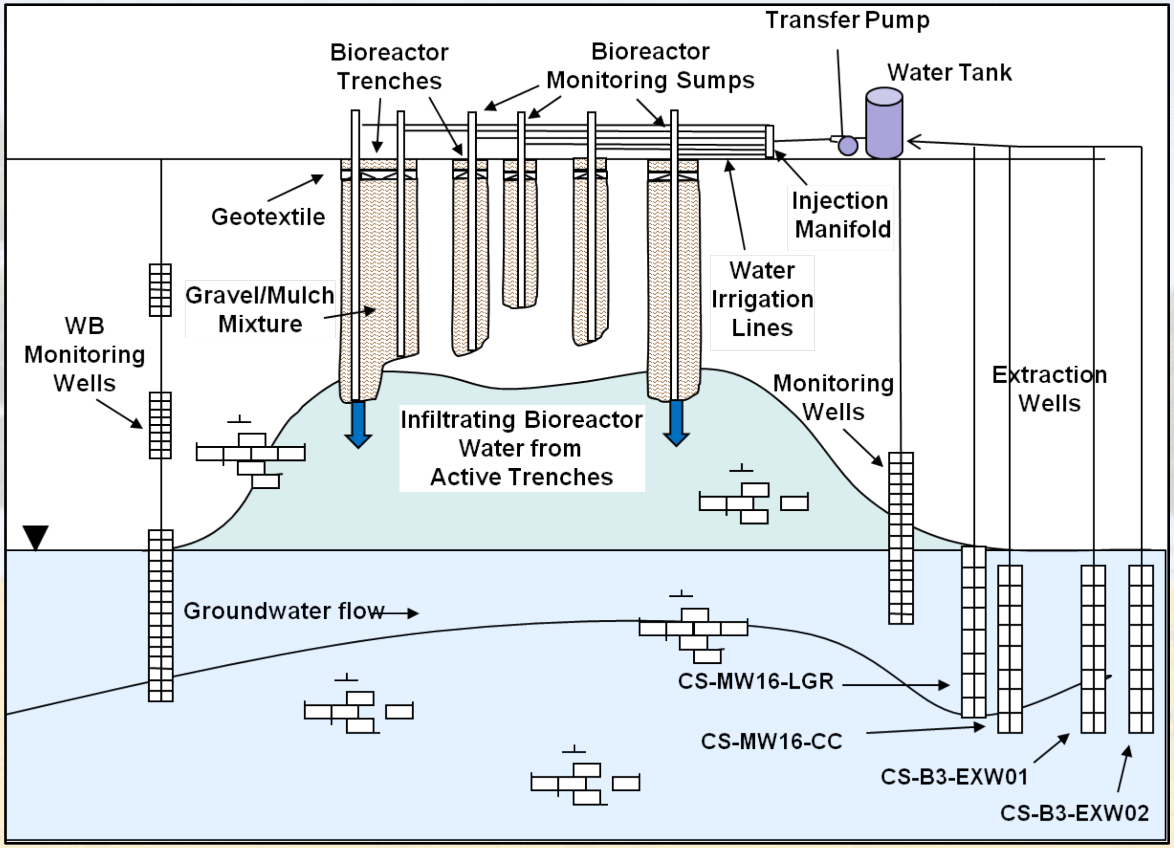

B-3
Source Area
O-1
Source Area
Plume 1
Ralph Fair Rd.
AOC-65
Source Area
Plume 2

PCE, March 2012

B-3 Bioreactor

General Observations

- Bioreactor is effectively treating approximately 20,000 gallons and 25,000 gallons of injected contaminated groundwater per day in Trenches 1 and 6, respectively.
- Biotic degradation is occurring with biological degradation end products ethylene, ethane, and CO_2 identified in surrounding UGR wells and LGR wells.
- Significant contamination likely remains in the fractured bedrock formation. Underlying VOC's are

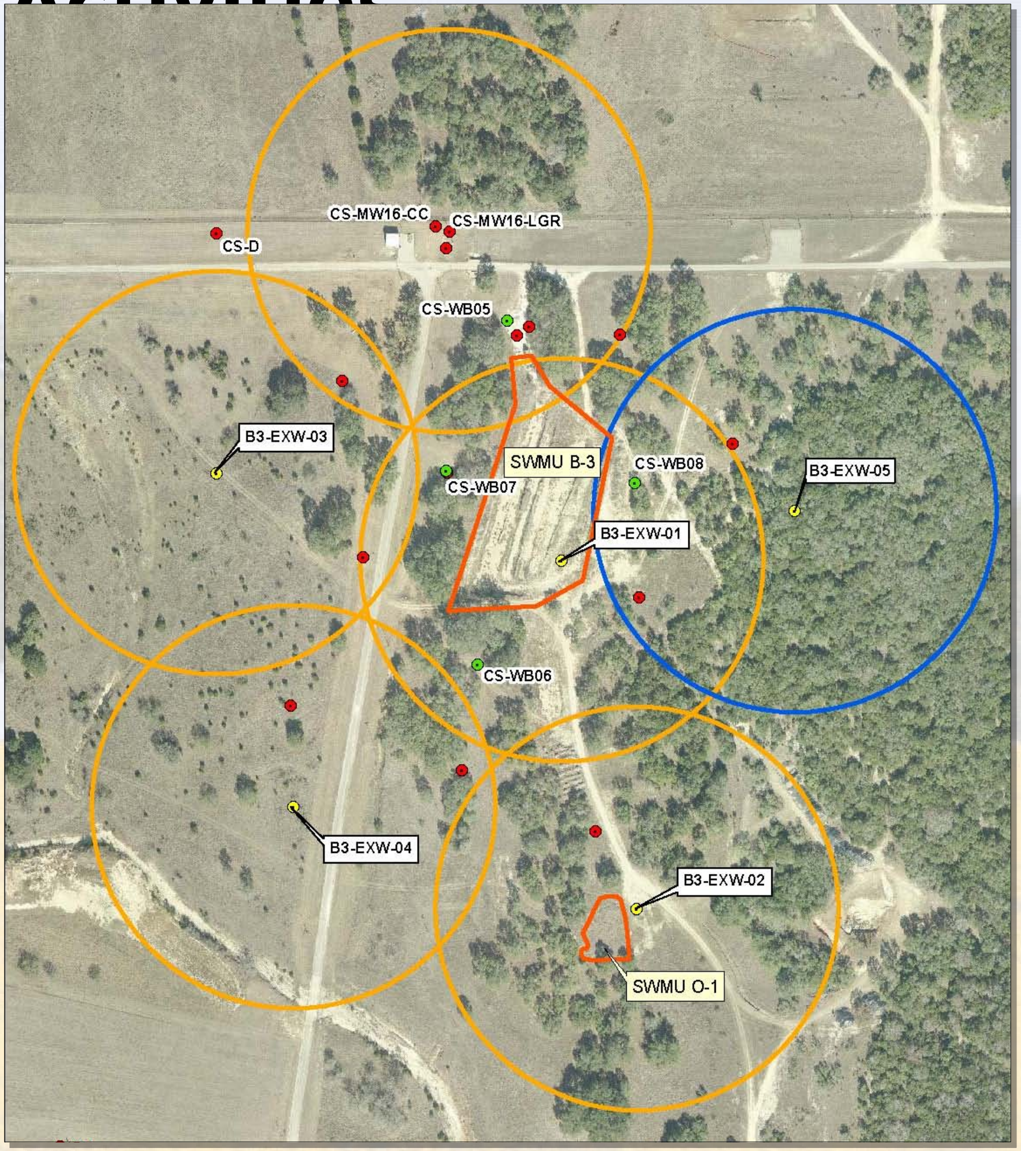

Transfer Pump
Bioreactor Trenches
Bioreactor Monitoring Sumps
Water Tank
Geotextile
Injection Manifold
Water Irrigation Lines
Gravel/Mulch Mixture
WB Monitoring Wells
Monitoring Wells
Extraction Wells
Infiltrating Bioreactor Water from Active Trenches
Groundwater flow
CS-MW16-LGR
CS-MW16-CC
CS-B3-EXW01
CS-B3-EXW02

Bioreactor Conceptual Diagram

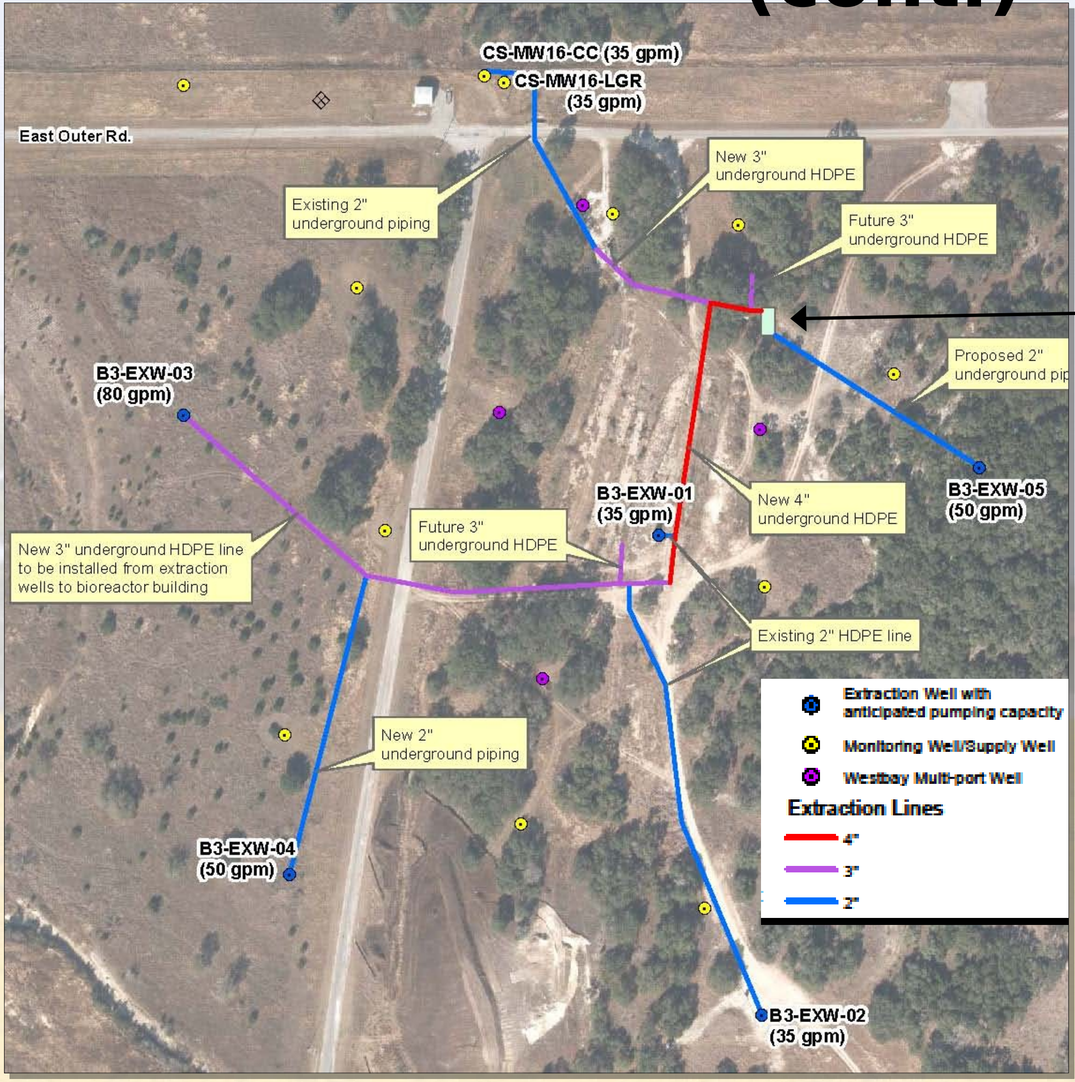
Recent Bioreactor Activities

- A request was made by the EPA to improve the monitoring network east of SWMU B-3 to ensure plume delineation.
- The addition of a new extraction well (EXW-05) provides an additional monitoring point and expands the recovery (extraction) area within the LGR.
- Once connected to the system, EXW-05 will provide additional contaminant mass.
    - Preliminary data from drilling indicate:

      PCE – 11.76 µg/L
      TCE – 43.16 µg/L
      cis-DCE – 23.92 µg/L


CS-MW16-CC
CS-MW16-LGR
CS-D
CS-WB05
SWMU B-3
CS-WB08
B3-EXW-03
B3-EXW-05
CS-WB07
B3-EXW-01
CS-WB06
B3-EXW-04
B3-EXW-02
SWMU O-1

Recent Bioreactor Activities (cont.)


CS-MW16-CC (35 gpm)
CS-MW16-LGR (35 gpm)
East Outer Rd.
Existing 2" underground piping
New 3" underground HDPE
Future 3" underground HDPE
Proposed 2" underground pip
B3-EXW-03 (80 gpm)
B3-EXW-01 (35 gpm)
New 4" underground HDPE
B3-EXW-05 (50 gpm)
New 3" underground HDPE line to be installed from extraction wells to bioreactor building
Future 3" underground HDPE
Existing 2" HDPE line
New 2" underground piping
B3-EXW-04 (50 gpm)
B3-EXW-02 (35 gpm)
Extraction Well with anticipated pumping capacity
Monitoring Well/Supply Well
Westbay Multi-port Well
Extraction Lines
4"
3"
2"

- The bioreactor control building has been completed and awaits SCADA control.
- Trenches 1, 2 and 6 have been recharged with mulch, gravel and new injection lines.

B-3 Bioreactor

Current Sampling Efforts

Regulatory Sampling

- VOCs
- TDS
- pH at injection site (field)

Performance Sampling

- MEE + CO_2
- Ferrous Iron
- Manganese
- Arsenic
- Total Organic Carbon
- Dissolved Organic Carbon
- Sulfide
- Sulfate and Chloride
- *Dehalococcoides*
- Dissolved Hydrogen

Regulatory Sampling Locations

- Injection Manifold (UIC) - Quarterly
- Trench Sumps - Semi-Annual
- WB-03B Zones - Semi-Annual

Performance Sampling Locations

Frequency: Semi-Annual

- Trench Sumps (5)
- WB zones (27)
- Extraction Wells (6)
- LGR Monitoring Wells (4)
- UGR Monitoring Wells (9)

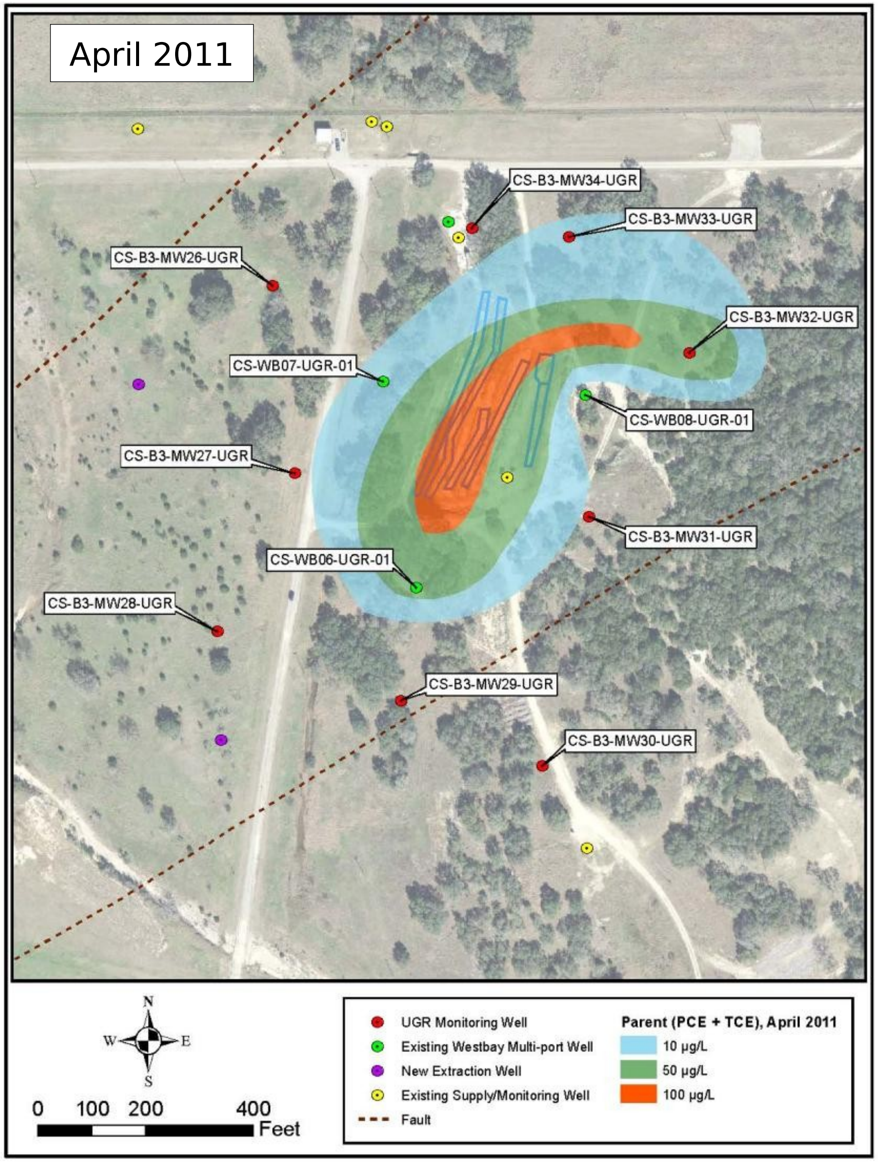
Field Parameters Collected

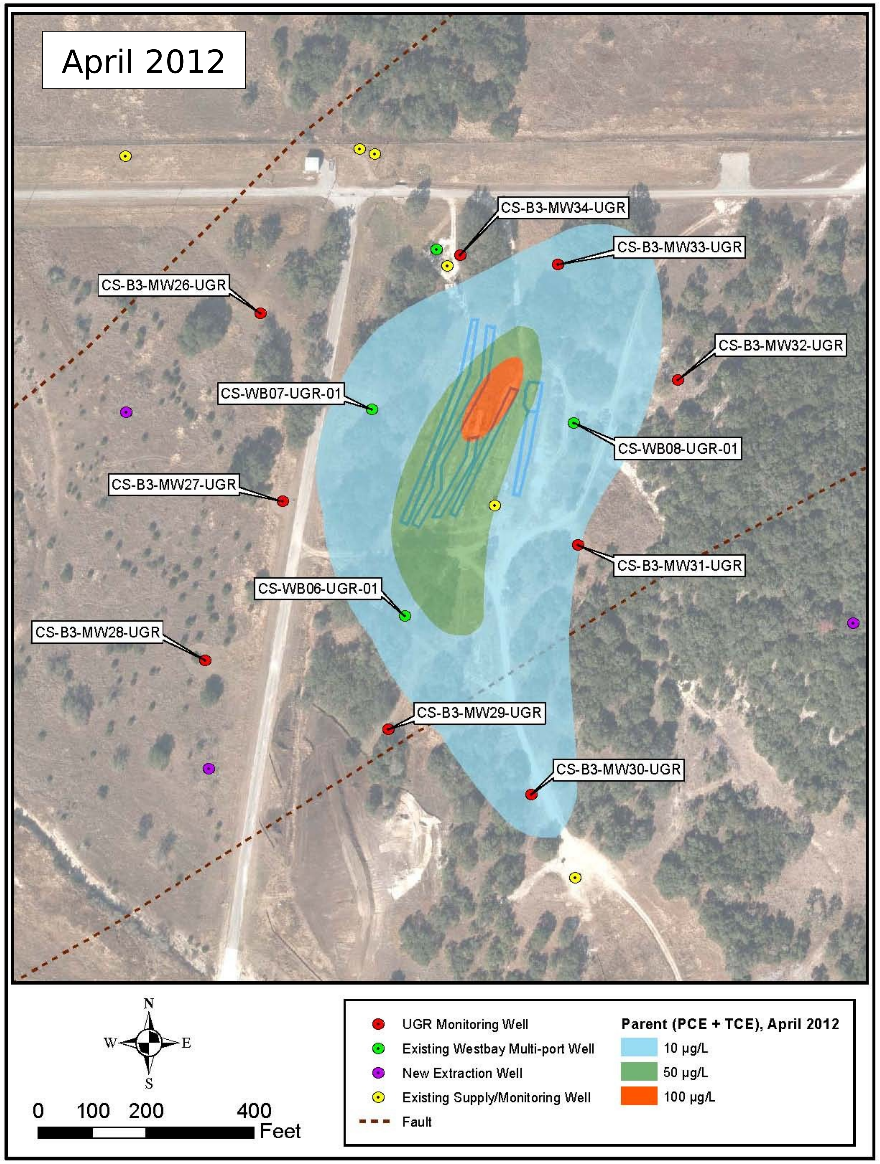
- **pH**
- **DO**
- **Conductivity**
- **ORP**
- **Temp**
- **Water Level**

B-3 Bioreactor

UGR Observations – PCE and TCE

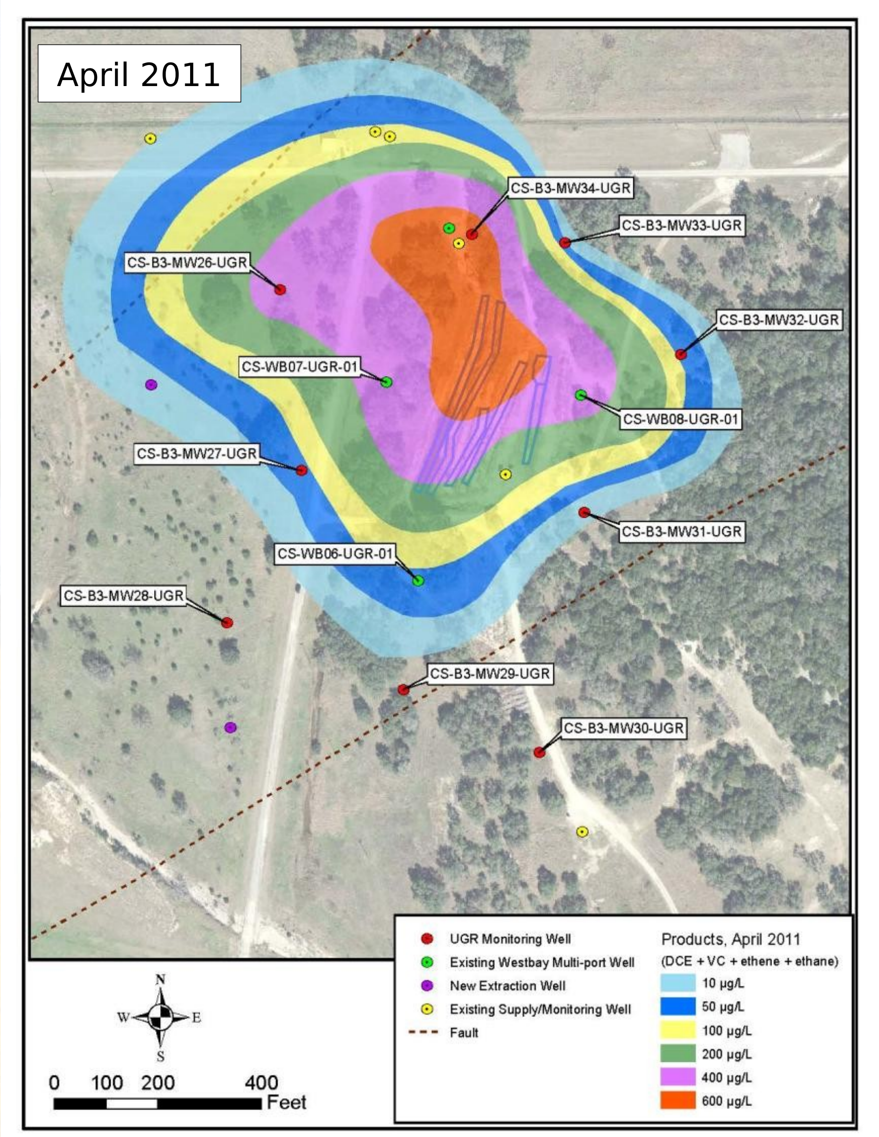
- PCE and TCE concentrations appear to remain stable within the bioreactor footprint.

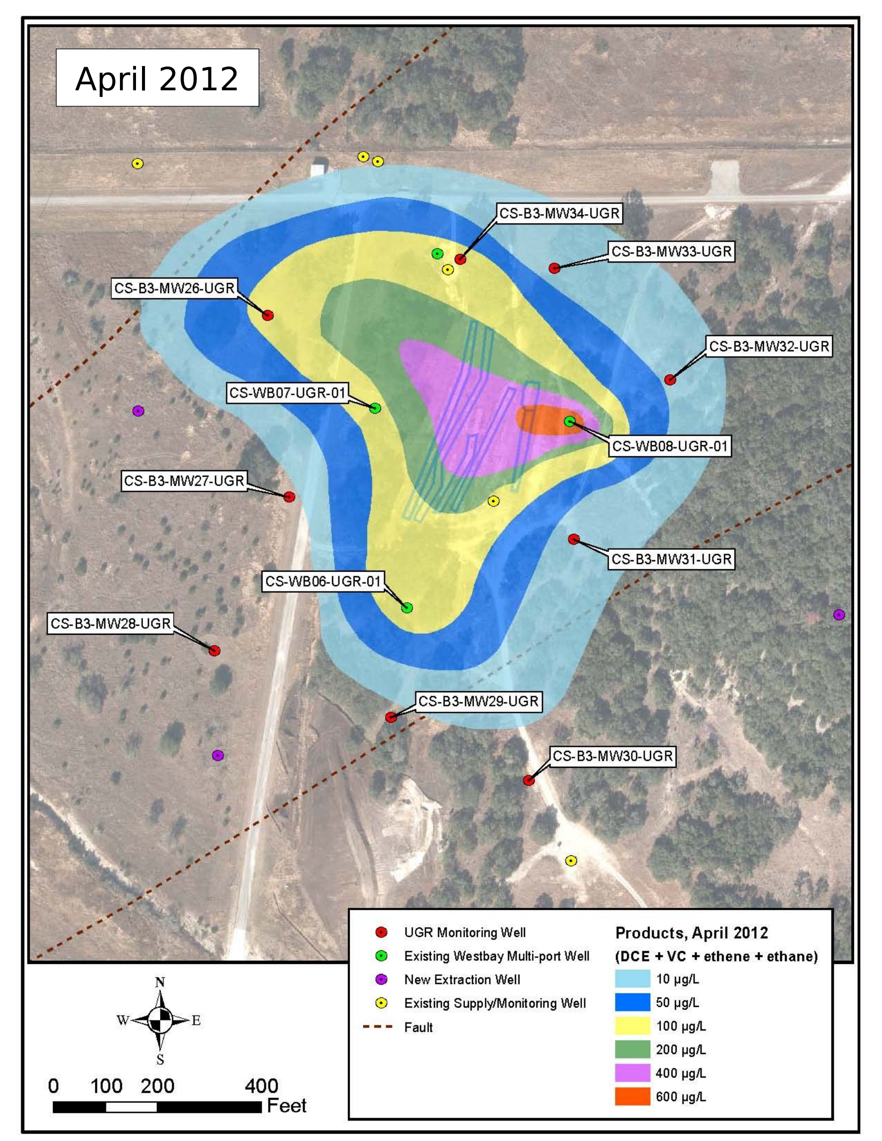

April 2011
CS-B3-MW34-UGR
CS-B3-MW33-UGR
CS-B3-MW26-UGR
CS-B3-MW32-UGR
CS-WB07-UGR-01
CS-WB08-UGR-01
CS-B3-MW27-UGR
CS-B3-MW31-UGR
CS-WB06-UGR-01
CS-B3-MW28-UGR
CS-B3-MW29-UGR
CS-B3-MW30-UGR
N
W
E
S
0
100
200
400
Feet
UGR Monitoring Well
Existing Westbay Multi-port Well
New Extraction Well
Existing Supply/Monitoring Well
Fault
Parent (PCE + TCE), April 2011
10 µg/L
50 µg/L
100 µg/L


April 2012
CS-B3-MW34-UGR
CS-B3-MW33-UGR
CS-B3-MW26-UGR
CS-B3-MW32-UGR
CS-WB07-UGR-01
CS-WB08-UGR-01
CS-B3-MW27-UGR
CS-B3-MW31-UGR
CS-WB06-UGR-01
CS-B3-MW28-UGR
CS-B3-MW29-UGR
CS-B3-MW30-UGR
N
W
E
S
0
100
200
400
Feet
UGR Monitoring Well
Existing Westbay Multi-port Well
New Extraction Well
Existing Supply/Monitoring Well
Fault
Parent (PCE + TCE), April 2012
10 µg/L
50 µg/L
100 µg/L

B-3 Bioreactor
UGR Observations – Dechlorination Products

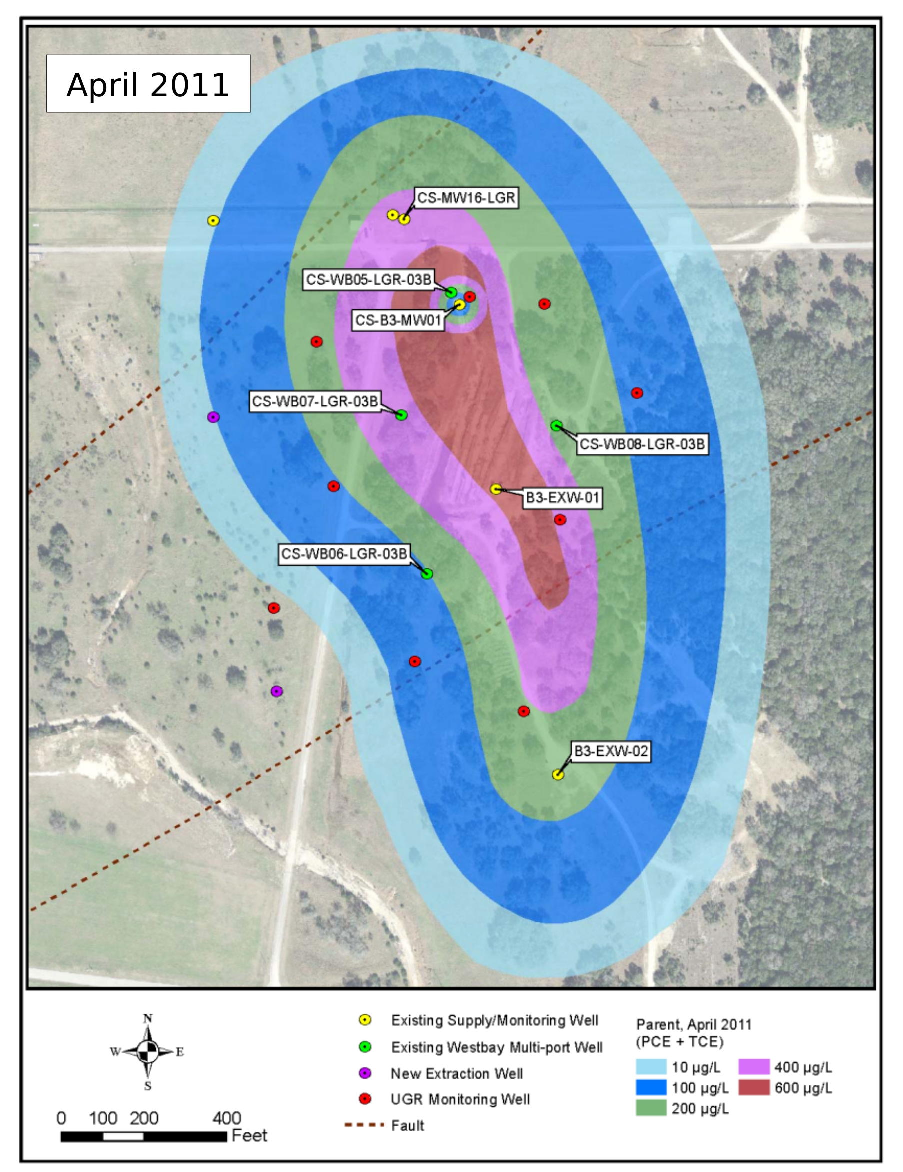
- Widespread presence of degradation products shows bioreactor influence.

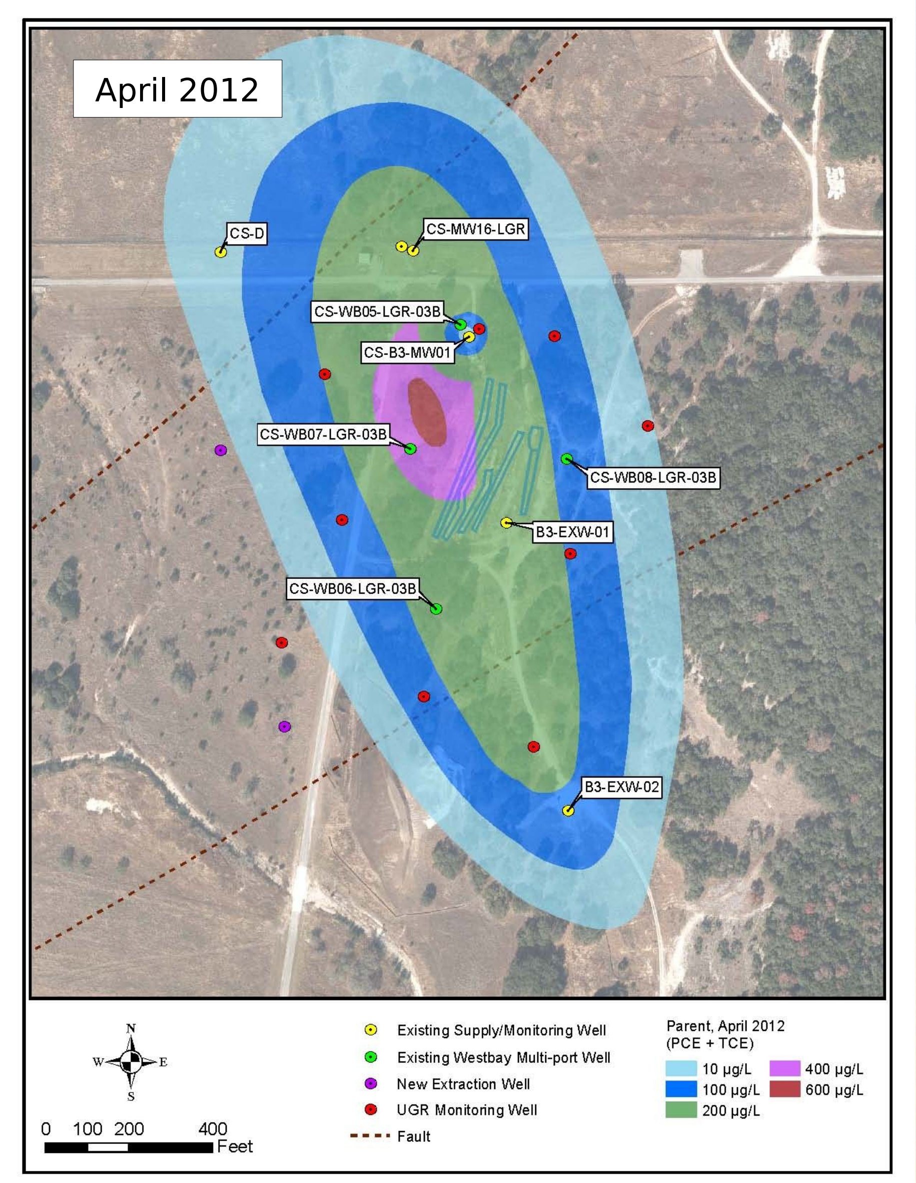

April 2011
CS-B3-MW34-UGR
CS-B3-MW33-UGR
CS-B3-MW26-UGR
CS-B3-MW32-UGR
CS-WB07-UGR-01
CS-WB08-UGR-01
CS-B3-MW27-UGR
CS-B3-MW31-UGR
CS-WB06-UGR-01
CS-B3-MW28-UGR
CS-B3-MW29-UGR
CS-B3-MW30-UGR
N
W
E
S
0 100 200 400
Feet
● UGR Monitoring Well
● Existing Westbay Multi-port Well
● New Extraction Well
⊙ Existing Supply/Monitoring Well
Fault
Products, April 2011
(DCE + VC + ethene + ethane)
10 µg/L
50 µg/L
100 µg/L
200 µg/L
400 µg/L
600 µg/L


April 2012
CS-B3-MW34-UGR
CS-B3-MW33-UGR
CS-B3-MW26-UGR
CS-B3-MW32-UGR
CS-WB07-UGR-01
CS-WB08-UGR-01
CS-B3-MW27-UGR
CS-B3-MW31-UGR
CS-WB06-UGR-01
CS-B3-MW28-UGR
CS-B3-MW29-UGR
CS-B3-MW30-UGR
N
W
E
S
0 100 200 400
Feet
● UGR Monitoring Well
● Existing Westbay Multi-port Well
● New Extraction Well
⊙ Existing Supply/Monitoring Well
Fault
Products, April 2012
(DCE + VC + ethene + ethane)
10 µg/L
50 µg/L
100 µg/L
200 µg/L
400 µg/L
600 µg/L

B-3 Bioreactor
LGR Observations – PCE and TCE

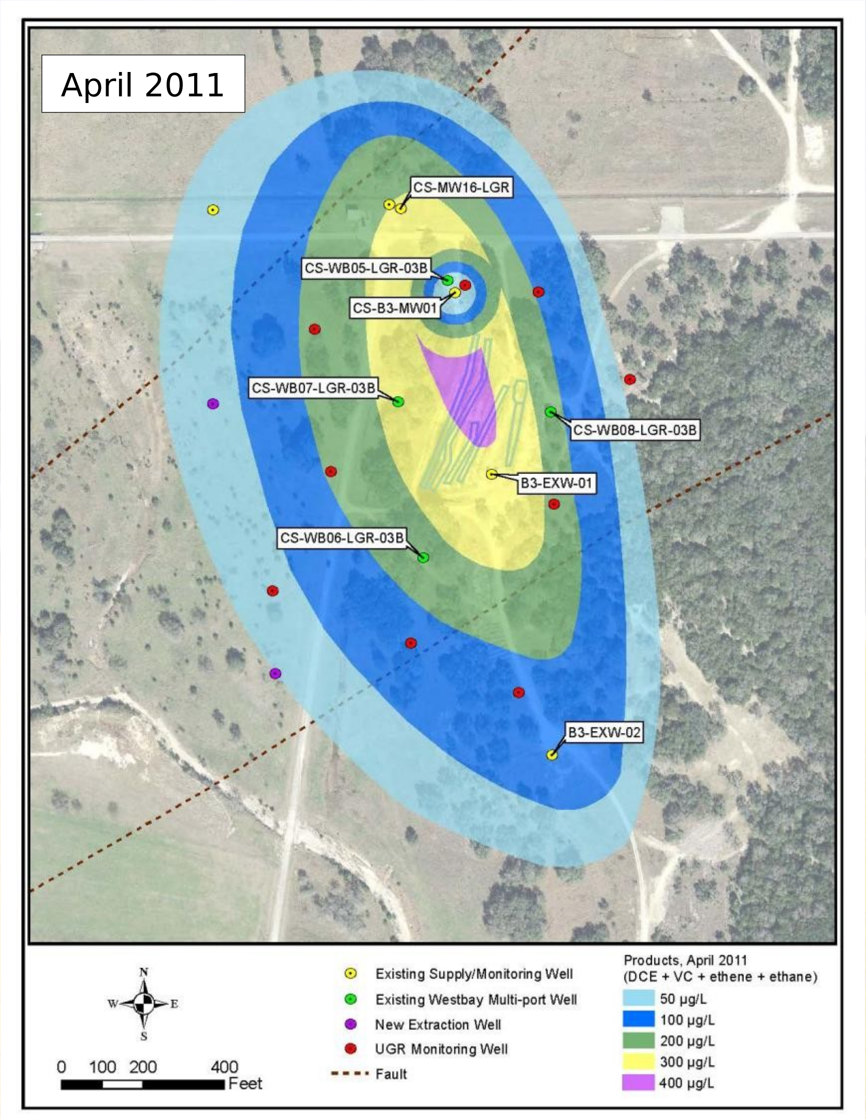
- Lack of PCE and TCE in the vicinity of CS-B3-MW01 reflect degradation associated with lactate injection in 2006.


April 2011
CS-MW16-LGR
CS-WB05-LGR-03B
CS-B3-MW01
CS-WB07-LGR-03B
CS-WB08-LGR-03B
B3-EXW-01
CS-WB06-LGR-03B
B3-EXW-02
N
W
E
S
0 100 200 400
Feet
Existing Supply/Monitoring Well
Existing Westbay Multi-port Well
New Extraction Well
UGR Monitoring Well
Fault
Parent, April 2011
(PCE + TCE)
10 µg/L
100 µg/L
200 µg/L
400 µg/L
600 µg/L

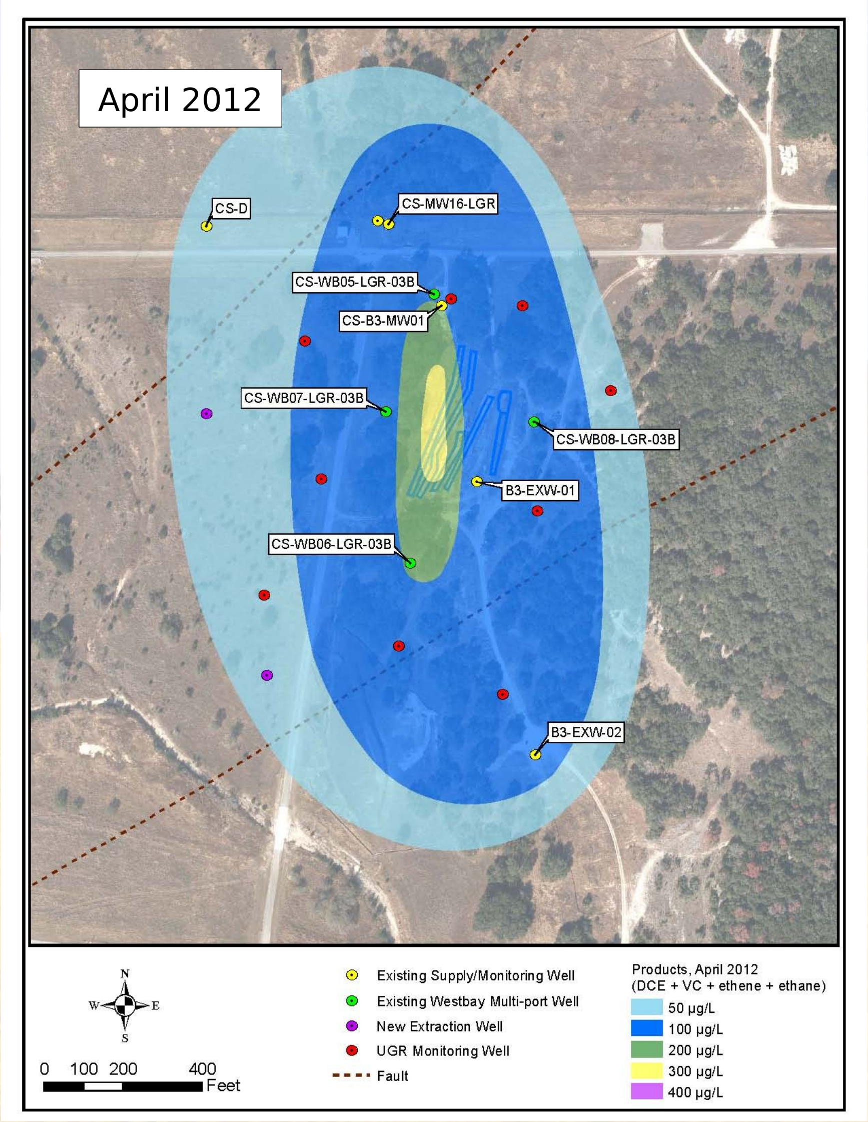

April 2012
CS-D
CS-MW16-LGR
CS-WB05-LGR-03B
CS-B3-MW01
CS-WB07-LGR-03B
CS-WB08-LGR-03B
B3-EXW-01
CS-WB06-LGR-03B
B3-EXW-02
N
W
E
S
0 100 200 400
Feet
Existing Supply/Monitoring Well
Existing Westbay Multi-port Well
New Extraction Well
UGR Monitoring Well
Fault
Parent, April 2012
(PCE + TCE)
10 µg/L
100 µg/L
200 µg/L
400 µg/L
600 µg/L

B-3 Bioreactor
LGR Observations – Dechlorination Products

- Moderate to low concentrations of *cis*-DCE are pervasive across the site.
- Vinyl chloride is detected at WB05 in LGR-03B, LGR-04A and LGR-04B zones, and LGR-CS-B3-MW01 (25, 49, 220, and 209 µg/L, respectively), possibly due to lactate injection activities.



April 2011
CS-MW16-LGR
CS-WB05-LGR-03B
CS-B3-MW01
CS-WB07-LGR-03B
CS-WB08-LGR-03B
B3-EXW-01
CS-WB06-LGR-03B
B3-EXW-02
N
W
E
S
0 100 200 400
Feet
Existing Supply/Monitoring Well
Existing Westbay Multi-port Well
New Extraction Well
UGR Monitoring Well
Fault
Products, April 2011
(DCE + VC + ethene + ethane)
50 µg/L
100 µg/L
200 µg/L
300 µg/L
400 µg/L

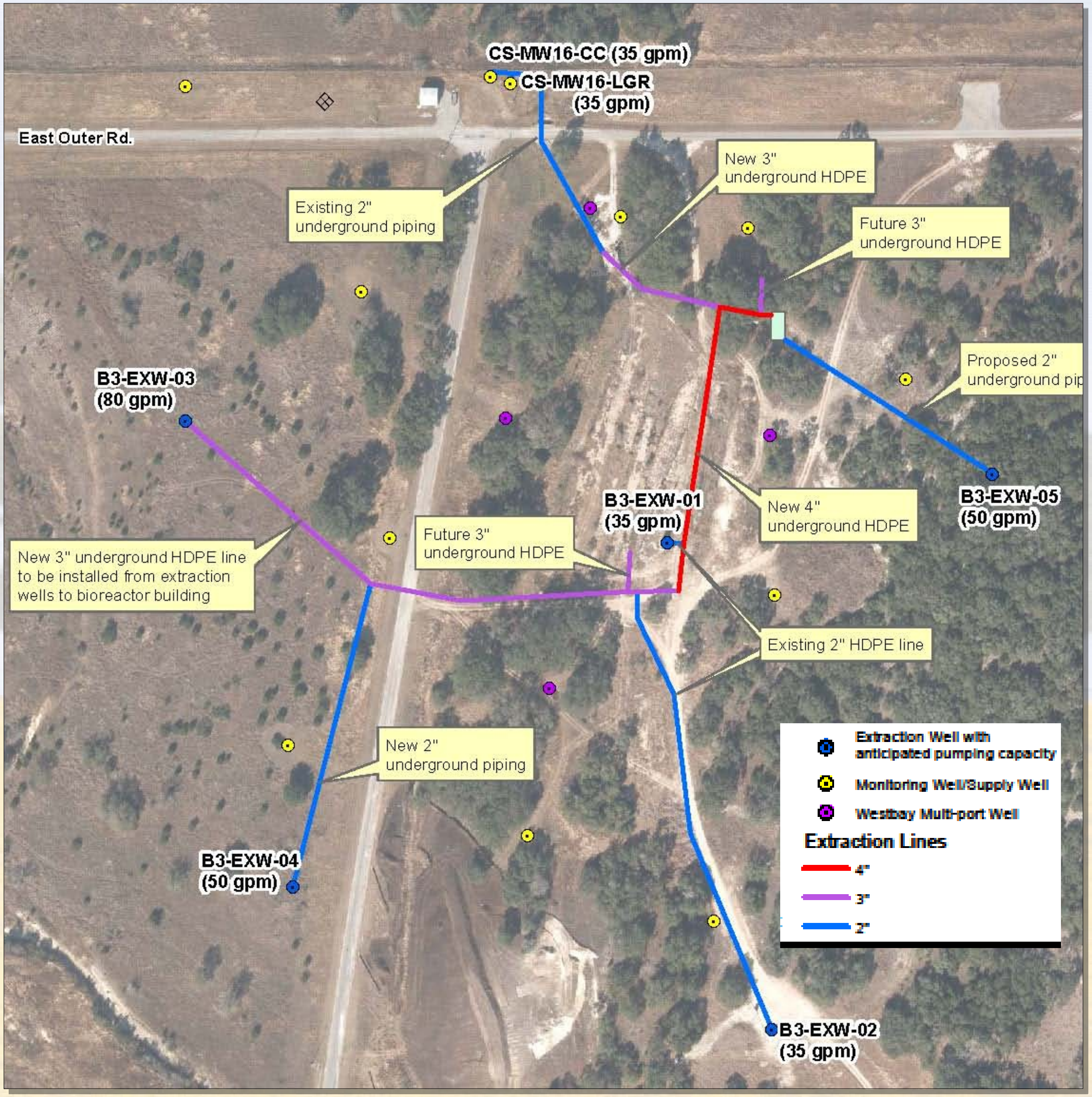


April 2012
CS-D
CS-MW16-LGR
CS-WB05-LGR-03B
CS-B3-MW01
CS-WB07-LGR-03B
CS-WB08-LGR-03B
B3-EXW-01
CS-WB06-LGR-03B
B3-EXW-02
N
W
E
S
0 100 200 400
Feet
Existing Supply/Monitoring Well
Existing Westbay Multi-port Well
New Extraction Well
UGR Monitoring Well
Fault
Products, April 2012
(DCE + VC + ethene + ethane)
50 µg/L
100 µg/L
200 µg/L
300 µg/L
400 µg/L

SWMU B-3 Bioreactor

Next Steps

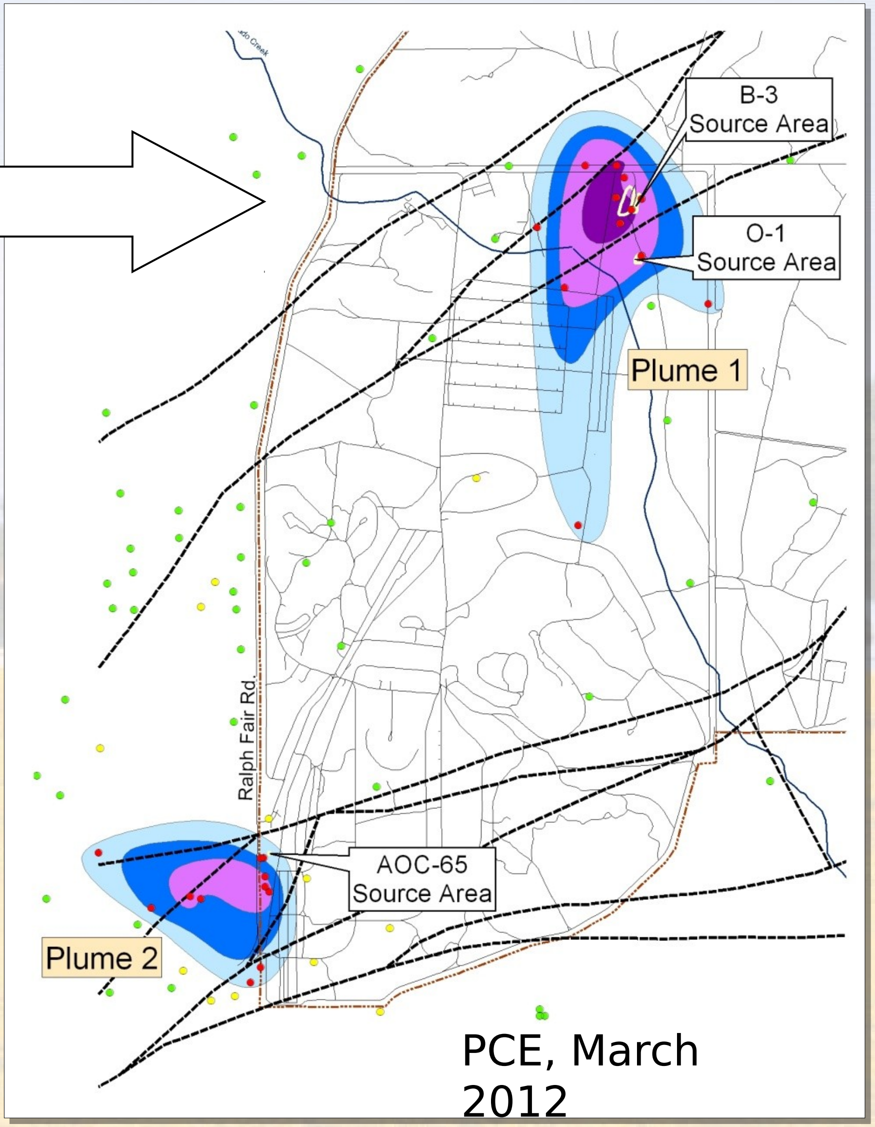
- Continue monitoring bioreactor.
- Update bioreactor injection and control systems.
- Recharge remaining trenches with additional mulch/gravel mixture and install new injection lines.
- Connect new LGR extraction well to the system (B3-EXW-05; east of bioreactor).


CS-MW16-CC (35 gpm)
CS-MW16-LGR (35 gpm)
East Outer Rd.
Existing 2" underground piping
New 3" underground HDPE
Future 3" underground HDPE
Proposed 2" underground pip
B3-EXW-03 (80 gpm)
B3-EXW-01 (35 gpm)
New 4" underground HDPE
B3-EXW-05 (50 gpm)
Future 3" underground HDPE
New 3" underground HDPE line to be installed from extraction wells to bioreactor building
Existing 2" HDPE line
New 2" underground piping
B3-EXW-04 (50 gpm)
B3-EXW-02 (35 gpm)
Extraction Well with anticipated pumping capacity
Monitoring Well/Supply Well
Westbay Multi-port Well
Extraction Lines
4"
3"
2"

SWMU B-3 and AOC-65
Description

1. **SWMU B-3 Bioreactor:** Enhanced anaerobic bioremediation of chlorinated hydrocarbons in underlying fractured limestone at Plume 1.

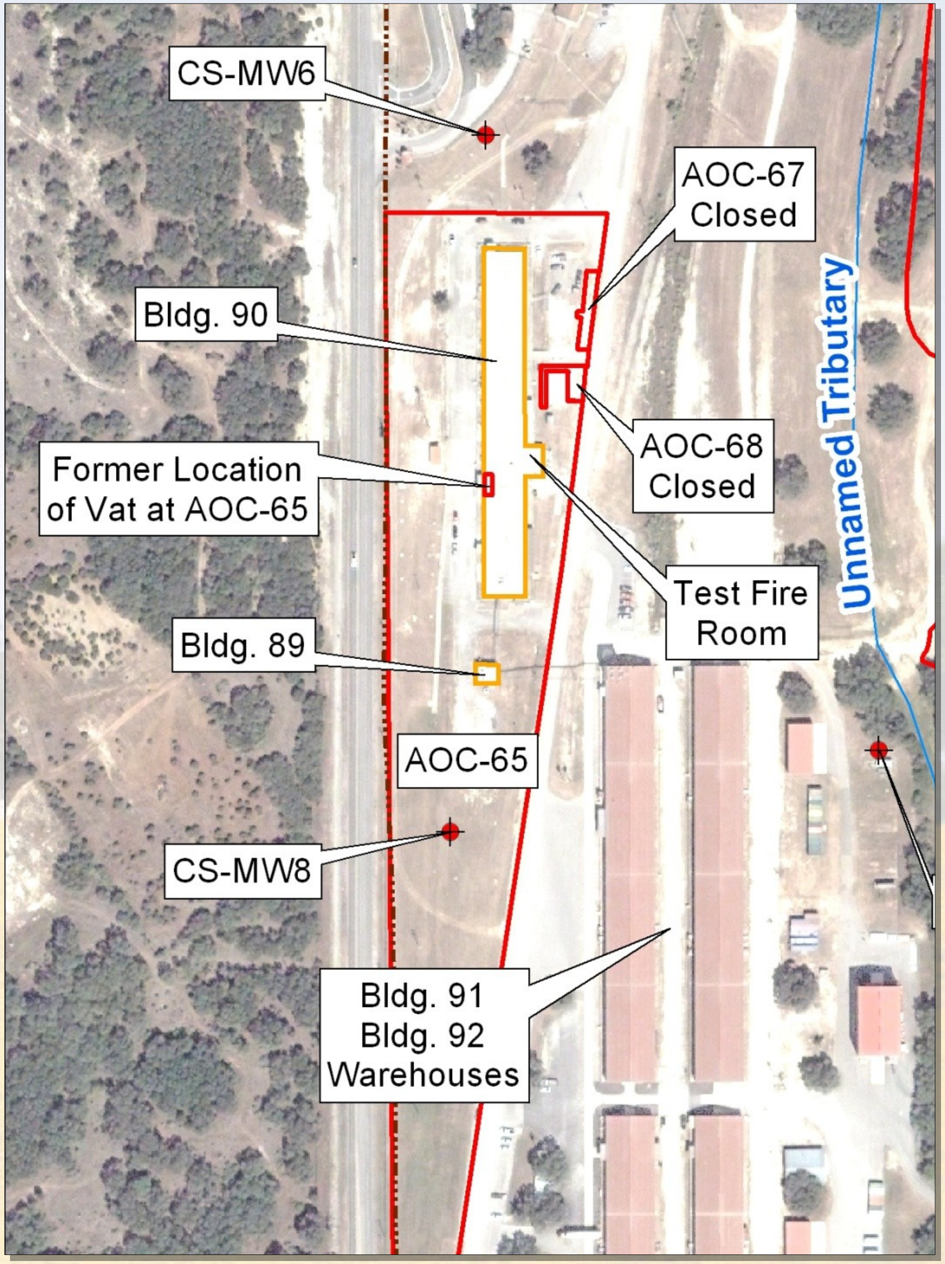
2. **AOC-65 Soil Vapor Extraction and Interim Removal Action:** Removal of chlorinated hydrocarbons in underlying fractured limestone at Plume 2.


B-3
Source Area
O-1
Source Area
Plume 1
Ralph Fair Rd.
AOC-65
Source Area
Plume 2

PCE, March 2012

AOC-65
Background

- AOC-65 consists of an area surrounding Building 90.
- Chlorinated solvent degreasing units (vats) were removed in 1995.
- Initial investigations identified groundwater plume (2) in 1999.
- Interim Removal Actions in 2001 excavated and disposed of ~1,300 CY of impacted soil media off-post.
- SVE Pilot Study initiated in 2002, which continues to operate within Permit By Rule Limits.


CS-MW6
AOC-67 Closed
Bldg. 90
AOC-68 Closed
Former Location of Vat at AOC-65
Unnamed Tributary
Test Fire Room
Bldg. 89
AOC-65
CS-MW8
Bldg. 91
Bldg. 92
Warehouses

AOC-65 Treatability Study

Activities since January 2012 :

- Excavated trench (as IRA) along drainage ditch west of Building 90.
- Performed fracture analysis on IRA trench walls.
- Constructed infiltration gallery for ISCO application within IRA trench.
- Conducted bench-scale testing for ISCO treatability study.
- Performed Sulfur Hexafluoride tracer test.
- Installed 7 treatability study wells for ISCO monitoring.

AOC-65 Interim Removal Action

- The IRA consisted of excavating a trench ~310 ft. long, ~3.5 ft. wide, and ~15 ft. deep.
- Approximately 1,000 CY of materials were removed.
- Sampling data indicated the presence of PCE in concentrations as high as 0.32 mg/kg in removed soils.
- Characterization data indicated soils met Class 3 waste criteria.

2012-02-29
2012-02-29

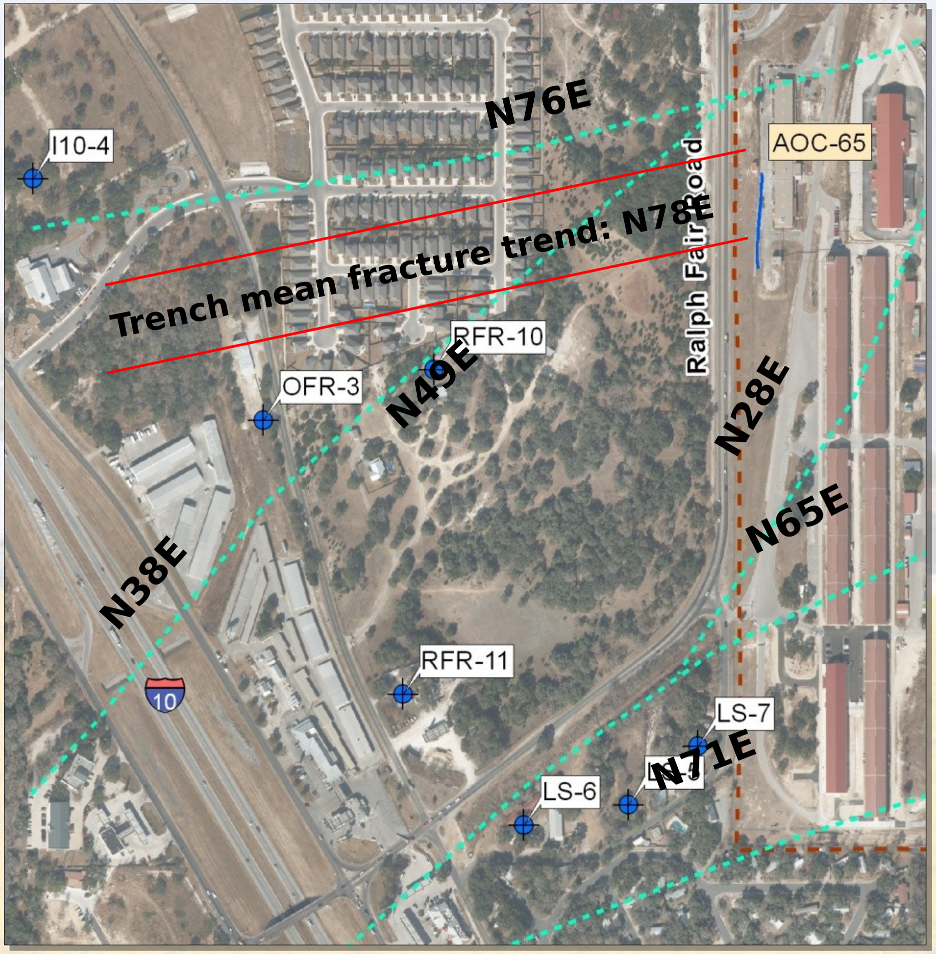
AOC-65 IRA Fracture Analysis

- Objective:
  - Determine vertical location of fractures within the trench to maximize exposure during ISCO application and construct infiltration gallery accordingly.
  - Determine fracture trends to best position Treatability Study Wells (TSWs) to

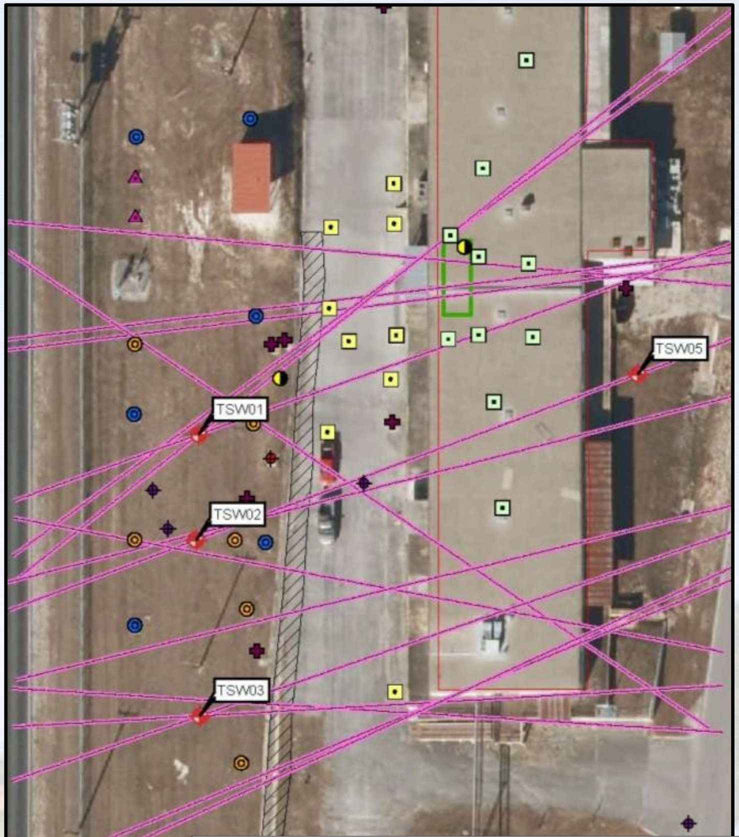
- Photo Documentation
  - Trench walls were photographed
  - Visible fractures were sketched in profiles
  - Fractures were matched across the trench
  - Fracture trends plotted

AOC-65 IRA Fracture Analysis (cont.)

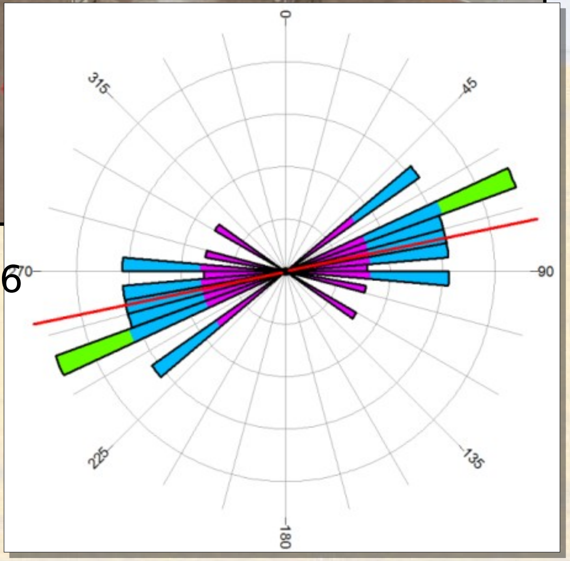
- TSW locations based on likely locations for fracture intersection.


N76E
I10-4
AOC-65
Trench mean fracture trend: N78E
Ralph Fair Road
RFR-10
OFR-3
N49E
N28E
N65E
N38E
RFR-11
10
LS-7
N71E
LS-6

USGS mapped faults


TSW05
TSW01
TSW02
TSW03

Fracture trends based on photo analysis.

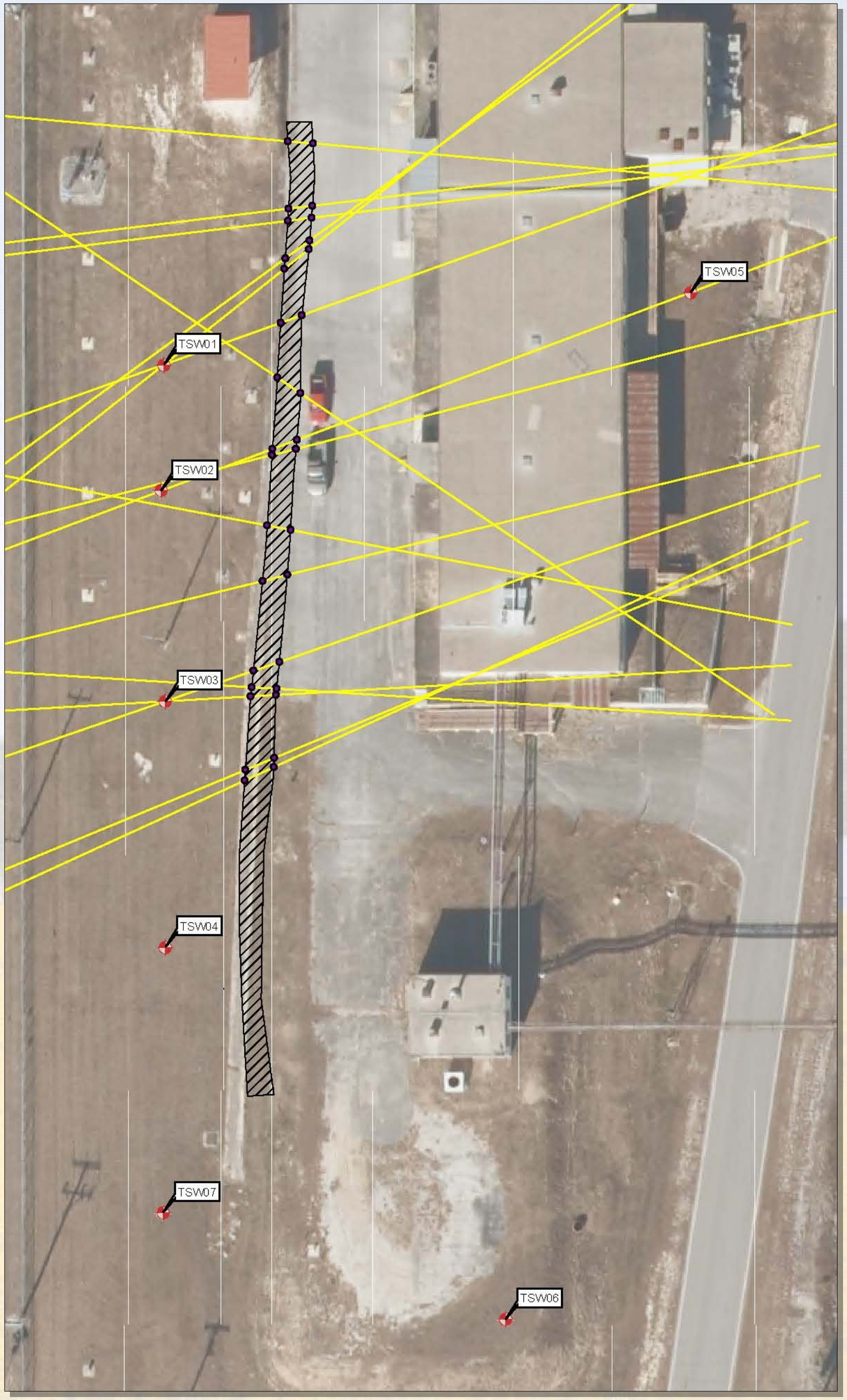


Rose diagram of 16 paired trench wall fractures.

Mean fracture trend: (red line): N78.2E

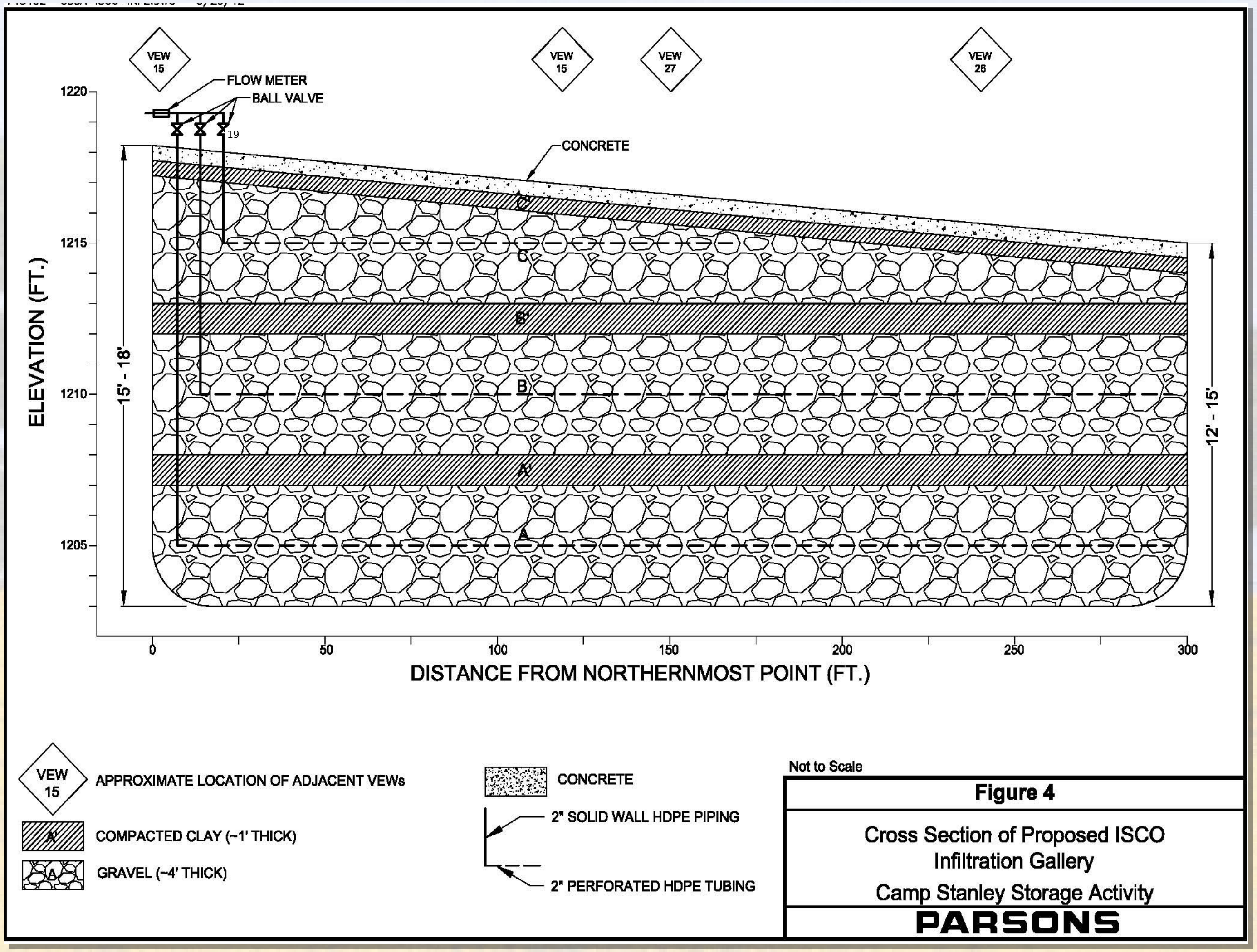
Treatability Study Well (TSW) Installation

- 7 TSWs have been installed to improve the groundwater monitoring network within AOC-65.
- TSWs will be monitoring points during the ISCO treatability study.
- TSW locations are generally based on results from trench wall fracture analyses.
- 6 TSWs are ~40’ deep with 30’ of screen. One TSW is ~50’ deep with 30’ screen.


TSW01
TSW02
TSW03
TSW04
TSW05
TSW06
TSW07

ISCO Infiltration Gallery Construction

- Each zone is comprised of ½”-sized quartz gravel and includes a 2” perforated HDPE line that runs the length of the trench and is separated from adjacent zones by a 1-foot thick layer of compacted clay.
- Note: ISCO material will also be injected at SIW-01, located in the former vat location within Bldg. 90.


VEW 15
VEW 15
VEW 27
VEW 26
FLOW METER
BALL VALVE
CONCRETE
1220
1215
1210
1205
ELEVATION (FT.)
15' - 18'
12' - 15'
C'
C
B'
B
A'
A
0
50
100
150
200
250
300
DISTANCE FROM NORTHERNMOST POINT (FT.)
VEW 15 APPROXIMATE LOCATION OF ADJACENT VEWs
A' COMPACTED CLAY (~1' THICK)
A GRAVEL (~4' THICK)
CONCRETE
2" SOLID WALL HDPE PIPING
2" PERFORATED HDPE TUBING
Not to Scale
Figure 4
Cross Section of Proposed ISCO Infiltration Gallery
Camp Stanley Storage Activity
PARSONS

ISCO Infiltration Gallery Construction (cont.)

Gravel added and leveled.

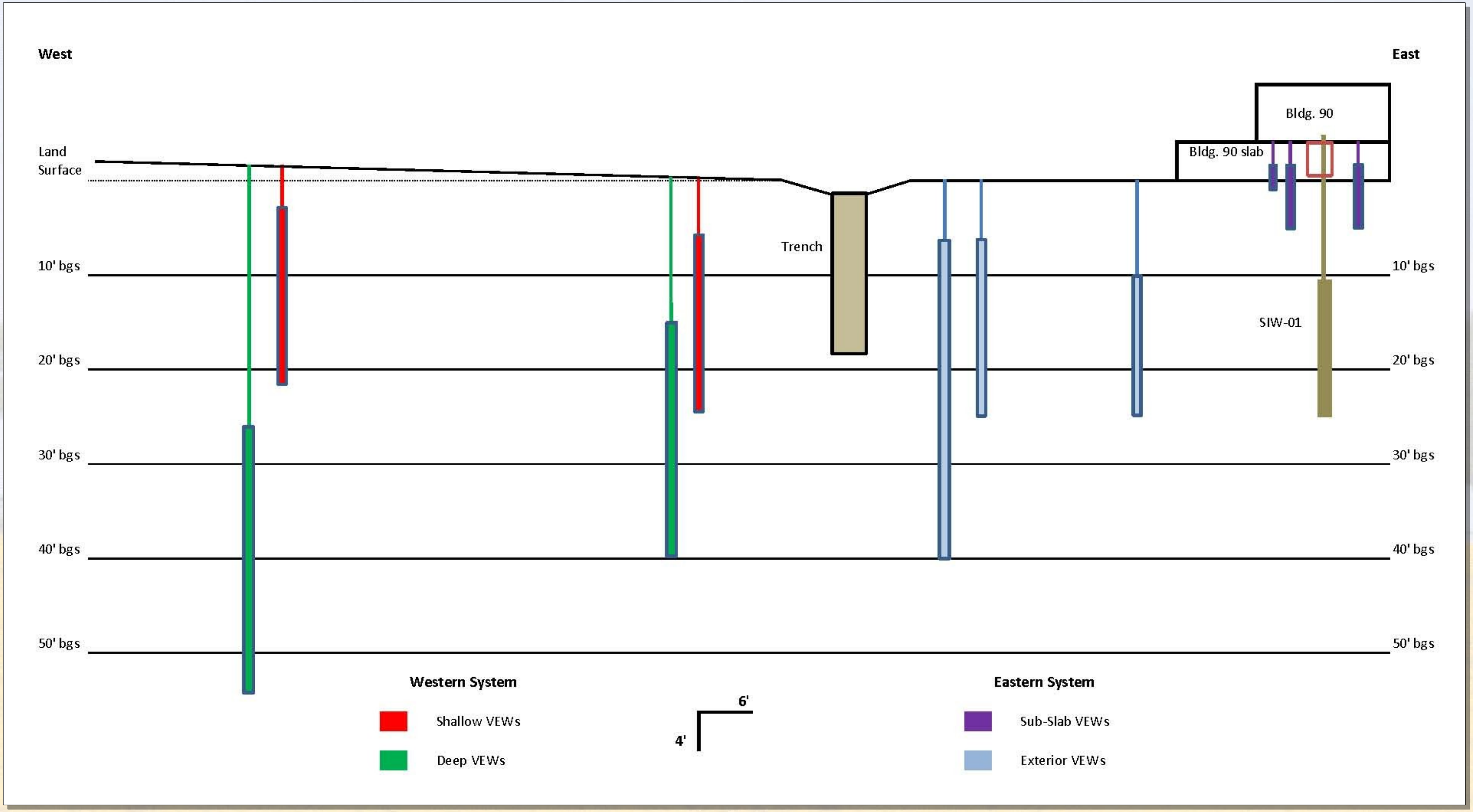
Injection lines installed.

Injection headers installed.

Clay layer added and compacted.

- The perforated HDPE injection lines terminate at the northern portion of the trench where they will be connected to tanks for oxidant and activator delivery.

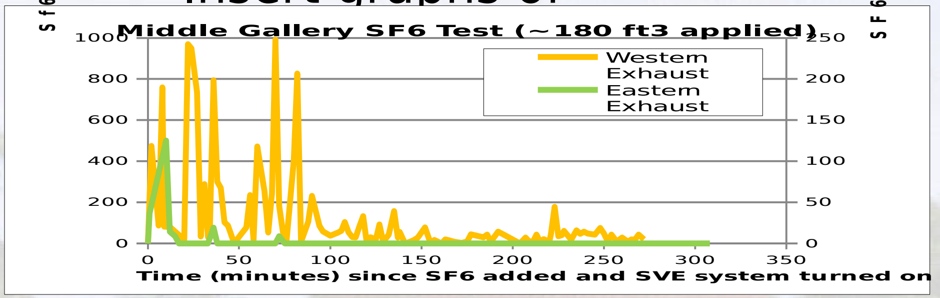
Sulfur Hexafluoride (SF6) Tracer Test
AOC-65 Profile View

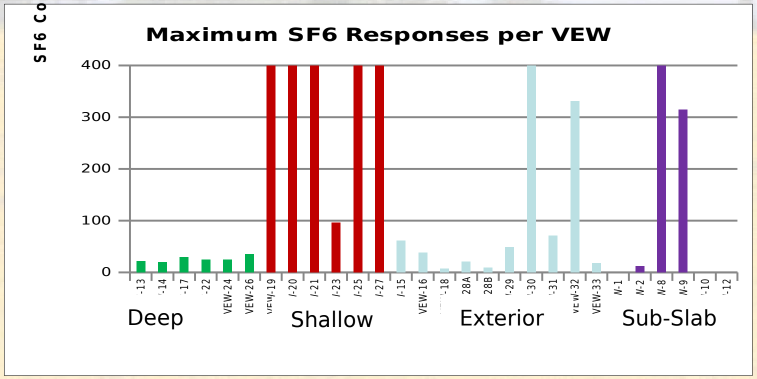

West
East
Bldg. 90
Bldg. 90 slab
Land Surface
Trench
SIW-01
10' bgs
20' bgs
30' bgs
40' bgs
50' bgs
10' bgs
20' bgs
30' bgs
40' bgs
50' bgs
Western System
🟥 Shallow VEWs
🟩 Deep VEWs
6'
4'
Eastern System
🟪 Sub-Slab VEWs
🟦 Exterior VEWs

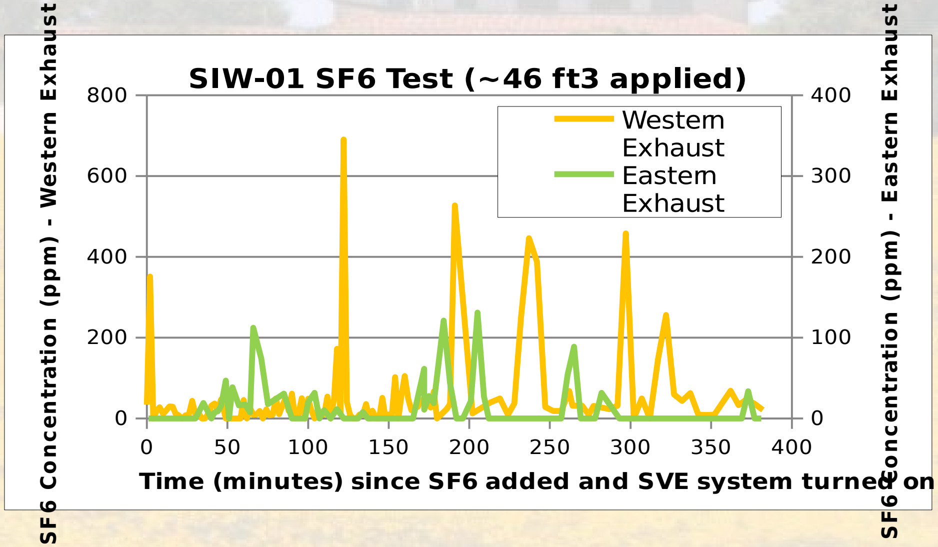
Sulfur Hexafluoride (SF_6) Tracer Test Objective

- Determine the effectiveness of the monitoring network and zone of influence of proposed ISCO application sites.
- Tests performed at SIW-01 and the Middle and Upper infiltration galleries.
- Note: Building 90 has been unoccupied since October 2011, thus there is no VI risk.

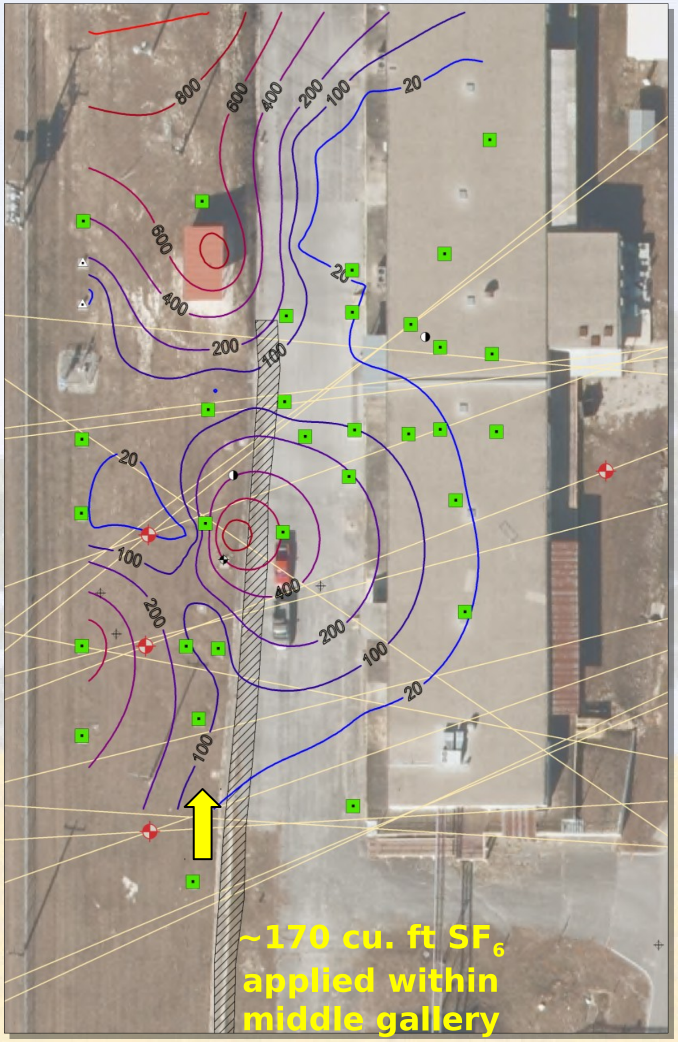
Insert graphs of







Sulfur Hexafluoride (SF$_6$) Tracer Test Results

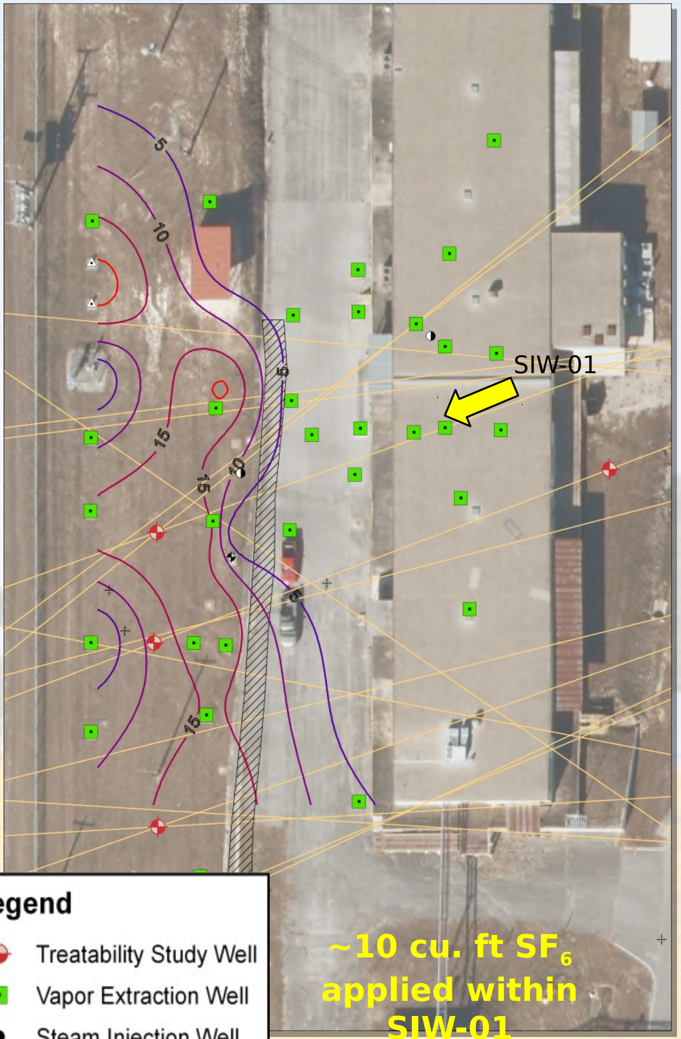

800
800
400
200
100
20
600
400
20
200
100
20
100
200
400
200
100
20
100

~170 cu. ft SF$_6$ applied within middle gallery

20
100
200
400
600
800
1000

SF$_6$ concentration (ppm)

- The SIW-01 SF$_6$ injections indicate that the area beneath Building 90 and area east of the trench will require ISCO injections in SIW-01 to affect these areas.
- Injection of SF$_6$ in the middle infiltration gallery are expected affect areas west of the trench (both shallow and deep.
- Anticipate injection of ISCO chemical in all zones of the


5
10
5
15
15
10
5
15
SIW-01

~10 cu. ft SF$_6$ applied within SIW-01

Legend

- Treatability Study Well
- 🟩 Vapor Extraction Well
- ◑ Steam Injection Well
- △ Piezometer
- + Monitoring Well
- Westbay Well
- Mapped Fracture
- ▨ Trench

5
10
15
20

SF$_6$ concentration (ppm)

ISCO Bench-Scale Test

- **Objective**: Determine ISCO oxidant and activator dosage requirements and determine potential for metals mobility.
- Core samples of correlative materials were sent to FMC

Klozur Demand Test Results	
Persulfate Demand (48-hour exposure)	Persulfate Demand (96-hour exposure)
0.418 g/kg	0.555 g/kg
Average Soil Oxidant Demand (SOD)	**0.49 g/kg**

- Based on the results of the KDT tests FMC recommends the use of:
  - 10 to 20% Klozur solution
  - activated with 25% NaOH

Oxidant (Klozur persulfate)		**Activator (25% NaOH)**	
dry weight (lbs)	19,800	Acid Neutralization Demand [(12.7 gallons per 100 lbs Klz)] (gallons)	2,514.6
20% solution [(1.9 lbs Klz/gal)] (gallons)	10,421	Soil Buffering Capacity [30% Acid neutralization demand] (gallons)	754.4
Total 20% Klozur persulfate required (gallons)	10,421	Total 25% NaOH demand (gallons)	3,269
Dosage requirement (20% Klz/25% NaOH) = **3.19 : 1** (gallons)			

ISCO Bench-Scale Test

Results (cont.)

- The oxidation process will mobilize metals due to changes in pH.
- Areas outside the treatment zone will not likely be affected as the metals are expected to precipitate out as the pH returns to a more neutral state.
- Metals monitoring will be included in the ISCO sampling plan for both on and off post

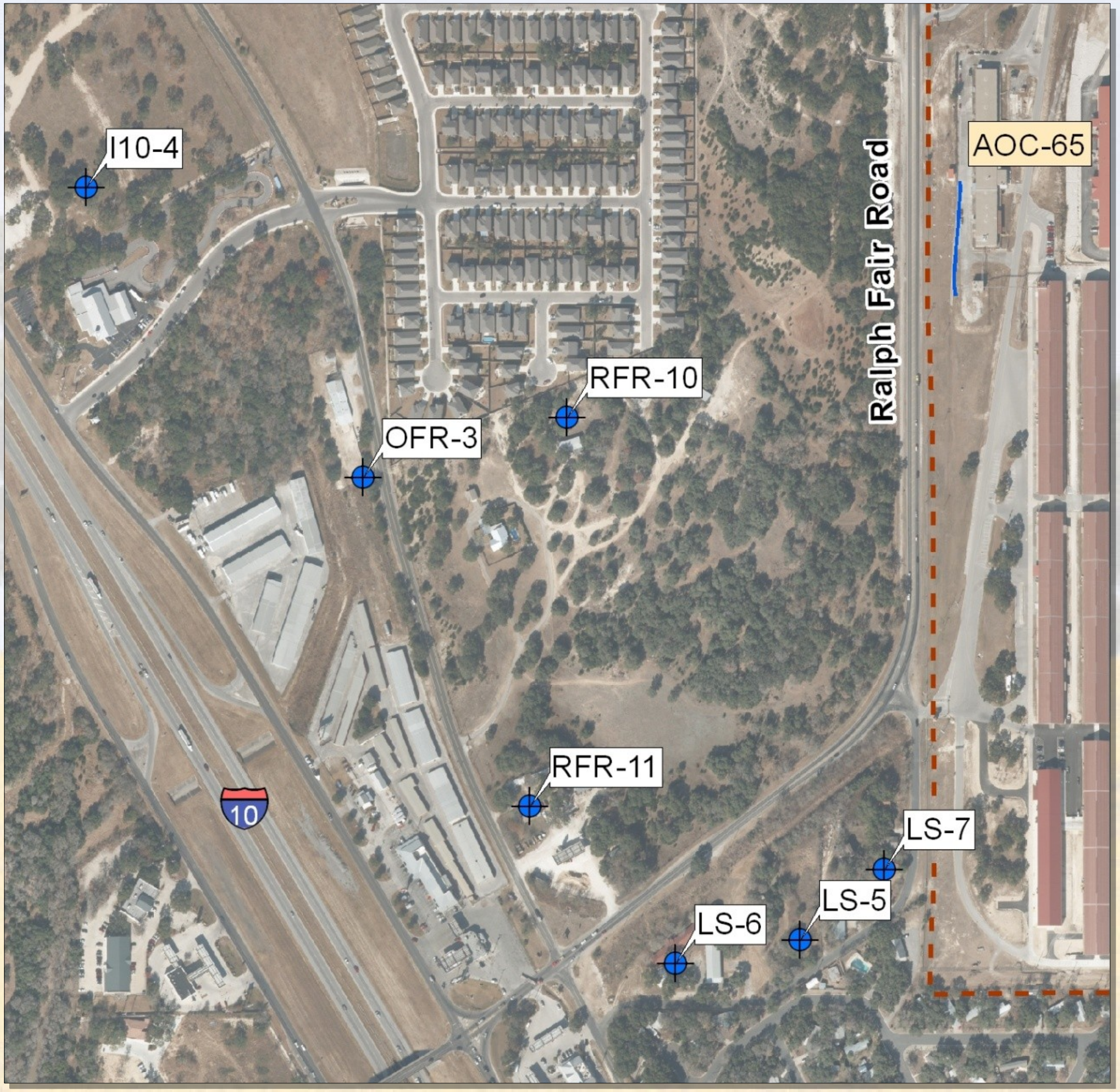
	Non-Exposed Core		Core after 96-hr Exposure Period		ISCO Solution following 96-hr Exposure	
Analyte	**Concentration (mg/kg)**	**Flag**	**Concentration (mg/kg)**	**Flag**	**Concentration (mg/L)**	**Flag**
Arsenic	3.1	F	2.7	F	26.23	
Barium	3.3		2.4		47.84	
Cadmium	ND	U	ND	U	ND	U
Chromium	3.4	F	2.9	F	39.38	
Copper	6.53		8.04		45.3	
Lead	0.85	F	ND	U	21.61	
Nickel	5.64		4.09		31.13	
Zinc	3.7	F	3.5	F	58.55	
Mercury	ND		ND	U	0.0014	F

AOC-65 ISCO Treatability Study

Next Steps

- A UIC permit has been obtained for the injection of Sodium Persulfate and Sodium Hydroxide. TCEQ Authorization No. 5X2600645

- Letters to GAC well owners have been sent describing ISCO injection activities and anticipated additional sampling efforts.


I10-4
AOC-65
Ralph Fair Road
RFR-10
OFR-3
10
RFR-11
LS-7
LS-5
LS-6

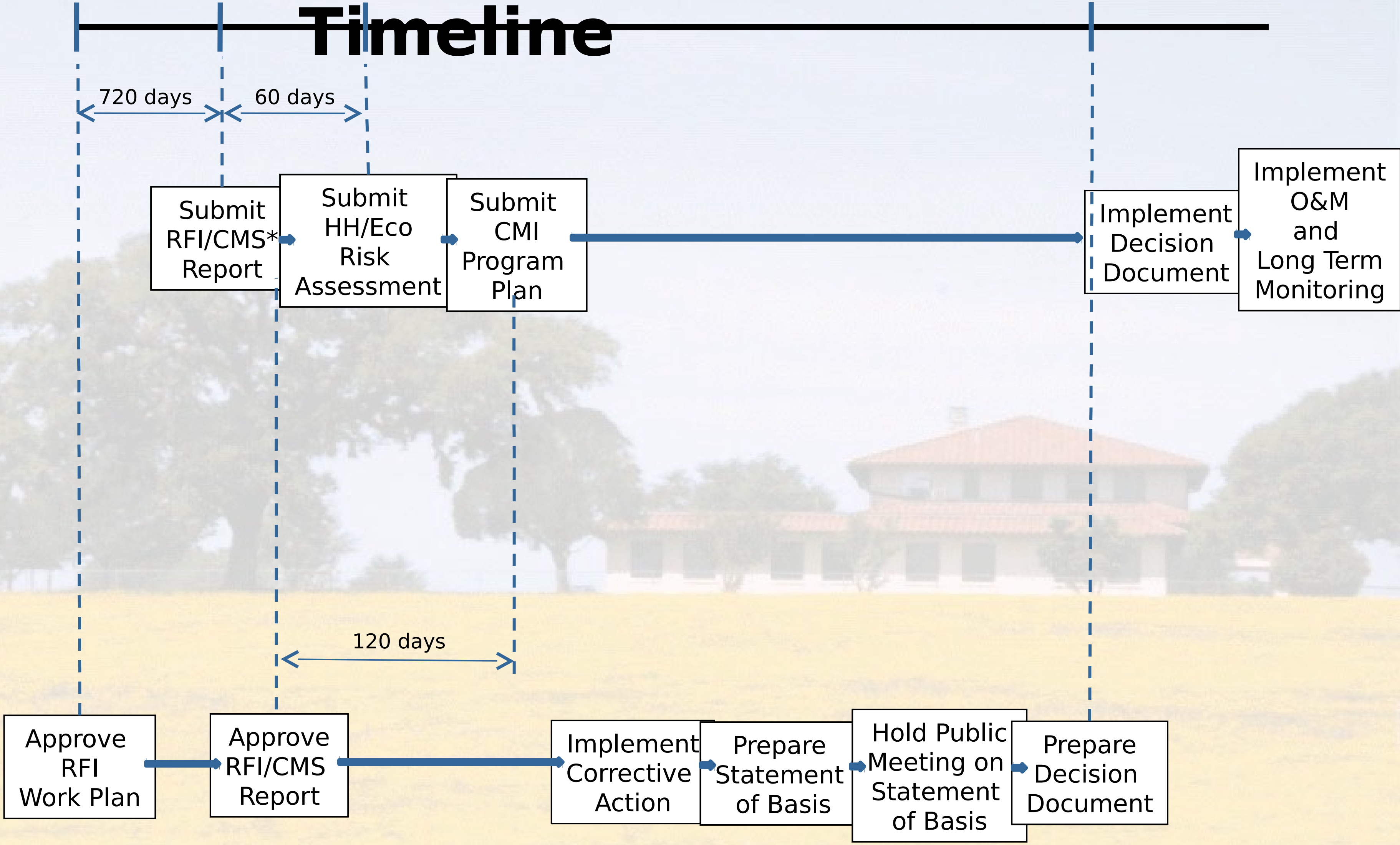
AOC-65 Treatability Study

Next Steps (Cont.)

- Continue monitoring SVE system to determine effectiveness of treating source area.
- Relocate Eastern system blowers inside Building 90.
- Engineer/install protection measures around operating Sub-Slab VEWs prior to Building 90 renovation efforts.
- Plug and abandon unused Sub-Slab VEWs prior to renovations.
- Expand SCADA control panels to accommodate flow meter instrumentation.
- Perform ISCO treatability study utilizing Klozur sodium persulfate activated with sodium hydroxide.
  - Application of oxidant and activator within all zones of infiltration gallery and SIW-01.
  - Sample collection 1, 5, 15, and 30 days after ISCO application at on-post and off post GAC wells.
    - Analyses: VOCs and EPA Priority Metals
    - Field Parameter collection: Water level and pH as well as field collected metals (via XRF)
  - Sample collection for field and laboratory analysis is expected to continue on a monthly basis at selected on-post and off-post well.
- Prepare ISCO Treatability Study Report

CLOSURE PATH FOR EPA ORDER

3008(H) Order Timeline



720 days

60 days

Submit RFI/CMS* Report

Submit HH/Eco Risk Assessment

Submit CMI Program Plan

Implement Decision Document

Implement O&M and Long Term Monitoring

120 days

Approve RFI Work Plan

Approve RFI/CMS Report

Implement Corrective Action

Prepare Statement of Basis

Hold Public Meeting on Statement of Basis

Prepare Decision Document

* The CMS Report is due 120 days after the RFI Report is submitted. However, CSSA plans to submit them concurrently.

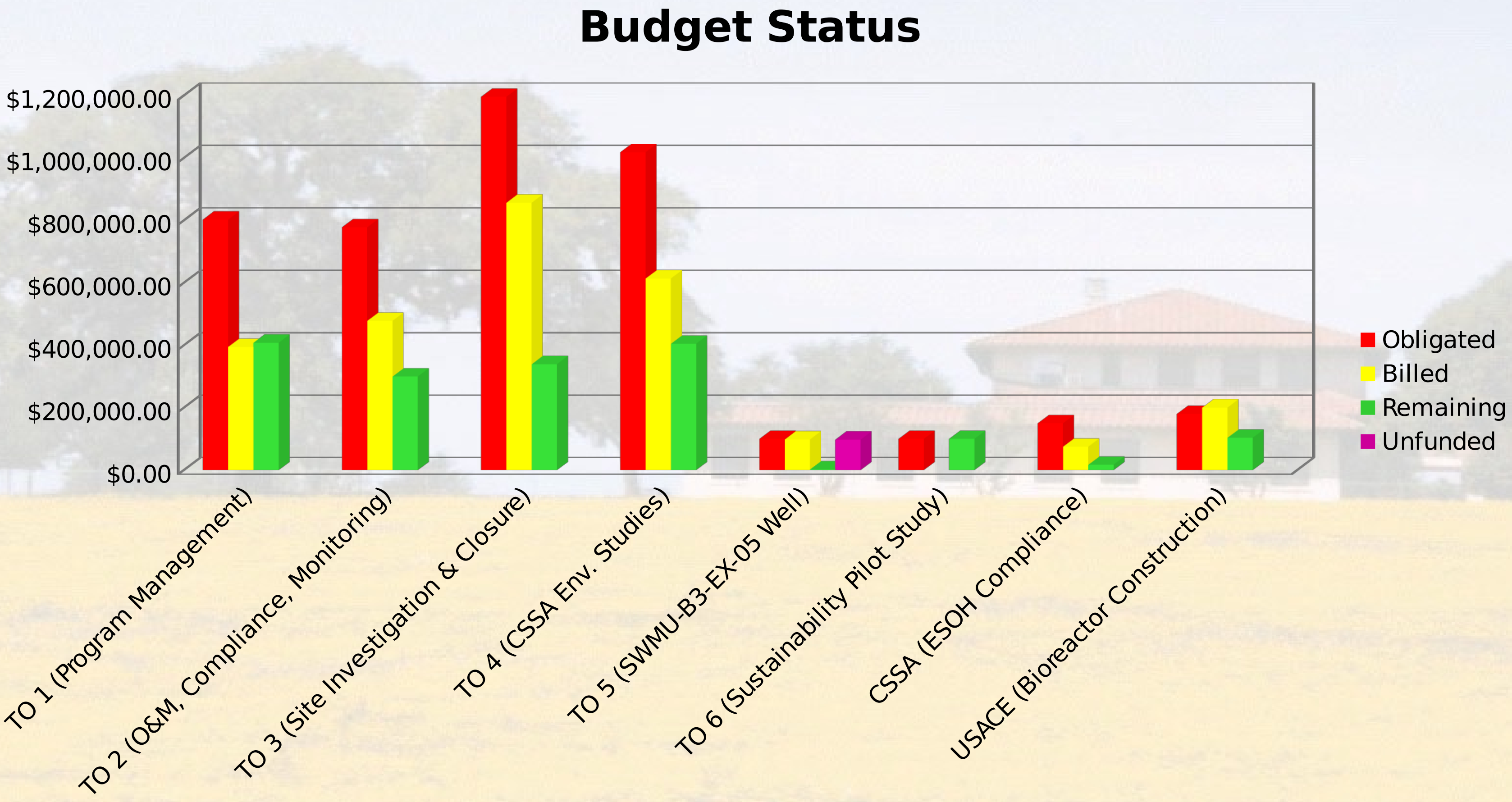
Associated Closure Documents/Steps

- RCRA Facility Investigation Report
- Corrective Measures Study
- Human Health and Ecological Risk Assessment
- Corrective Measures Implementation Program Plan
- Implement Corrective Action
- Statement of Basis
- Public Meeting
- Decision Document
- Others? (LUCs, Periodic Reviews)

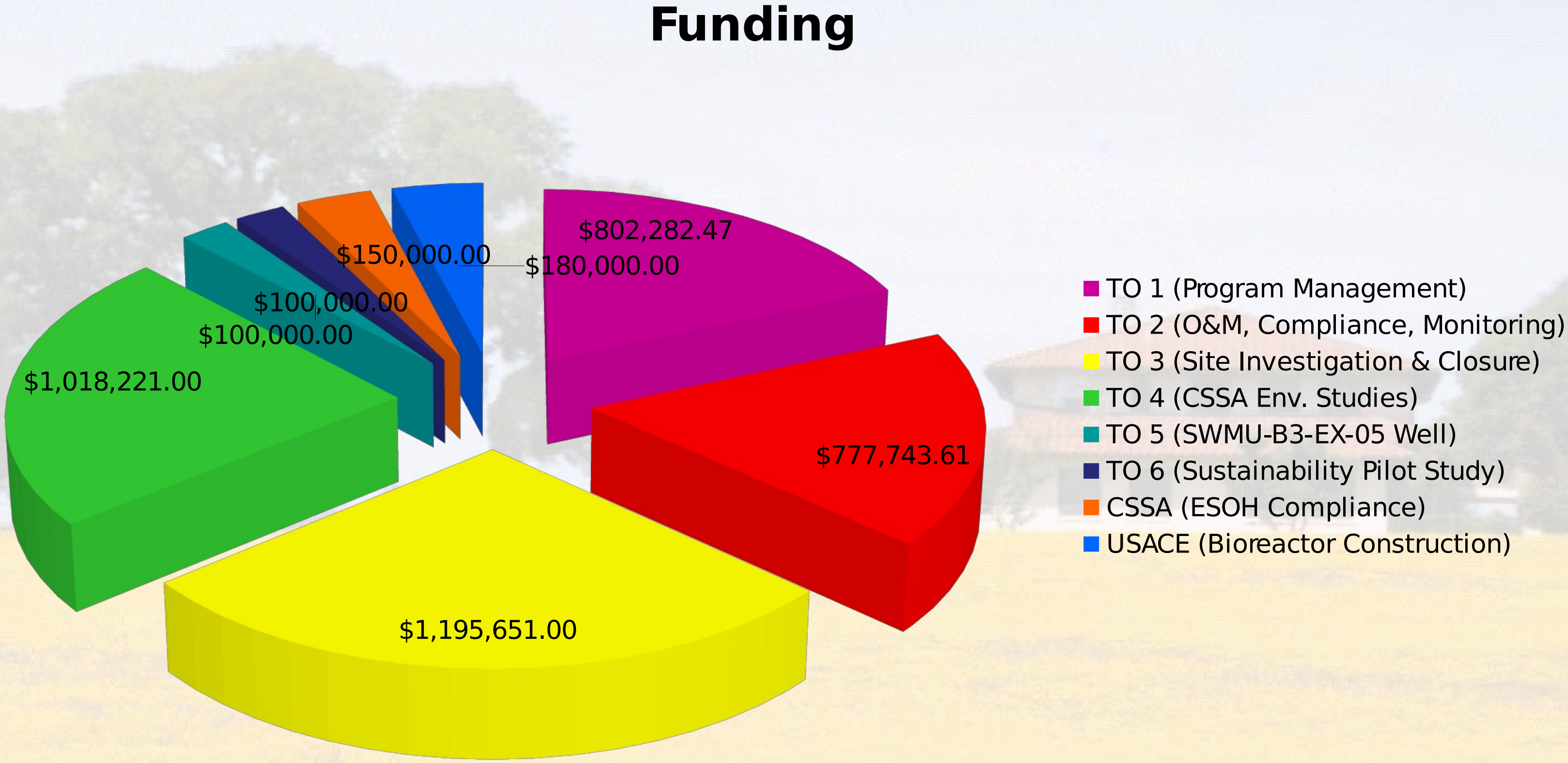
Funding, Budget, and Program Status

Gabe’s Slides

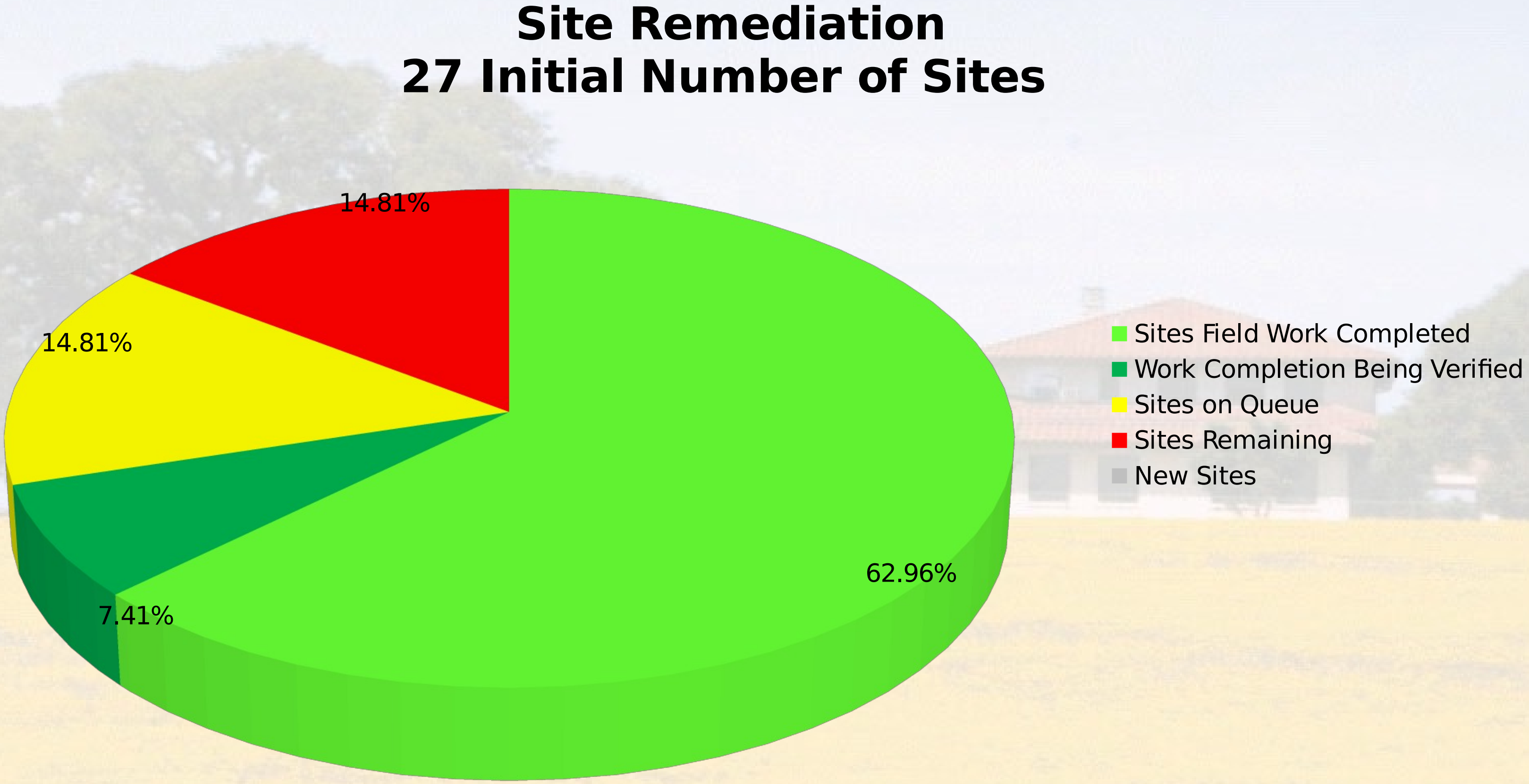
2012 Budget to Date



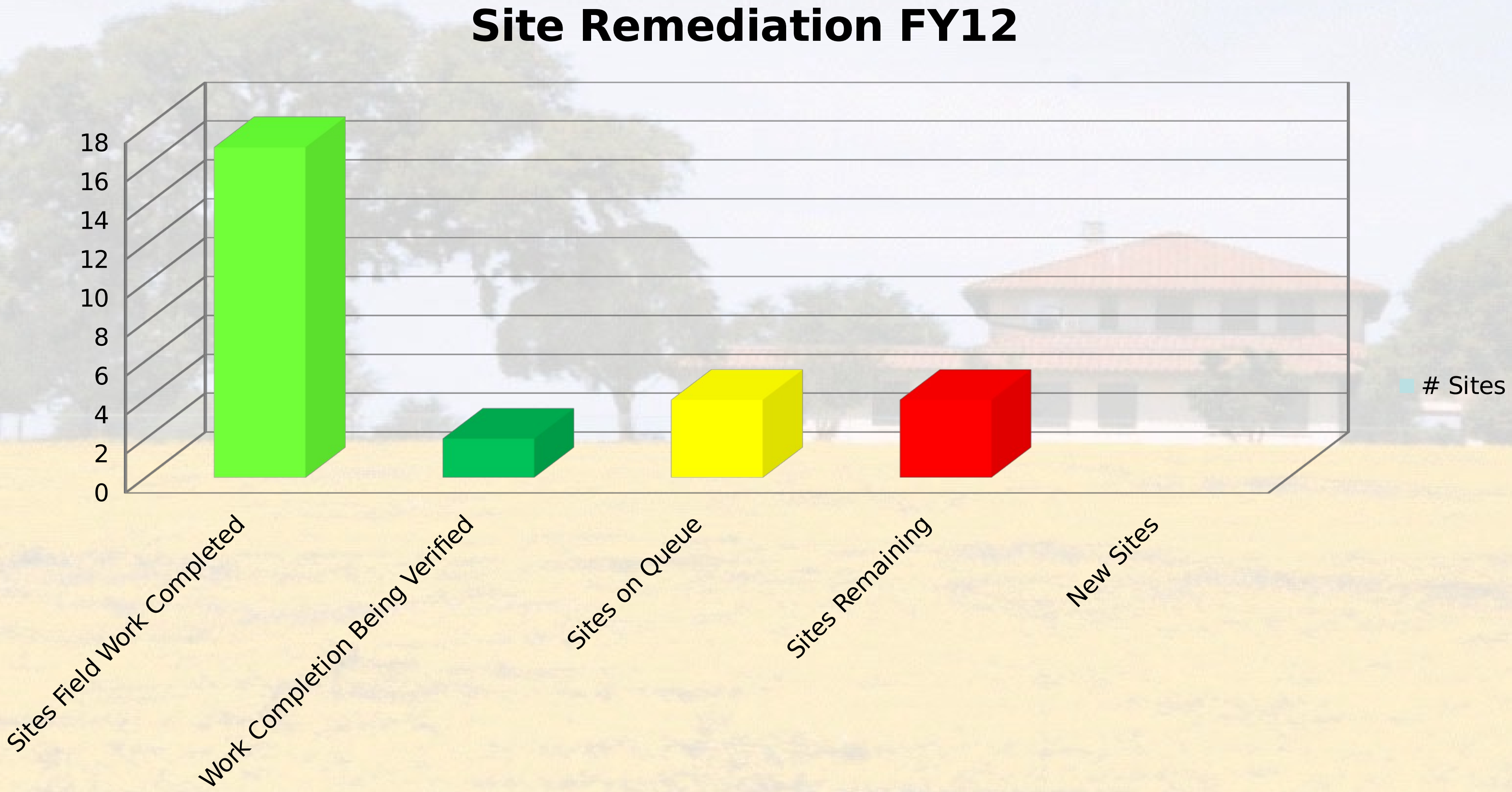
2012 Budget to Date



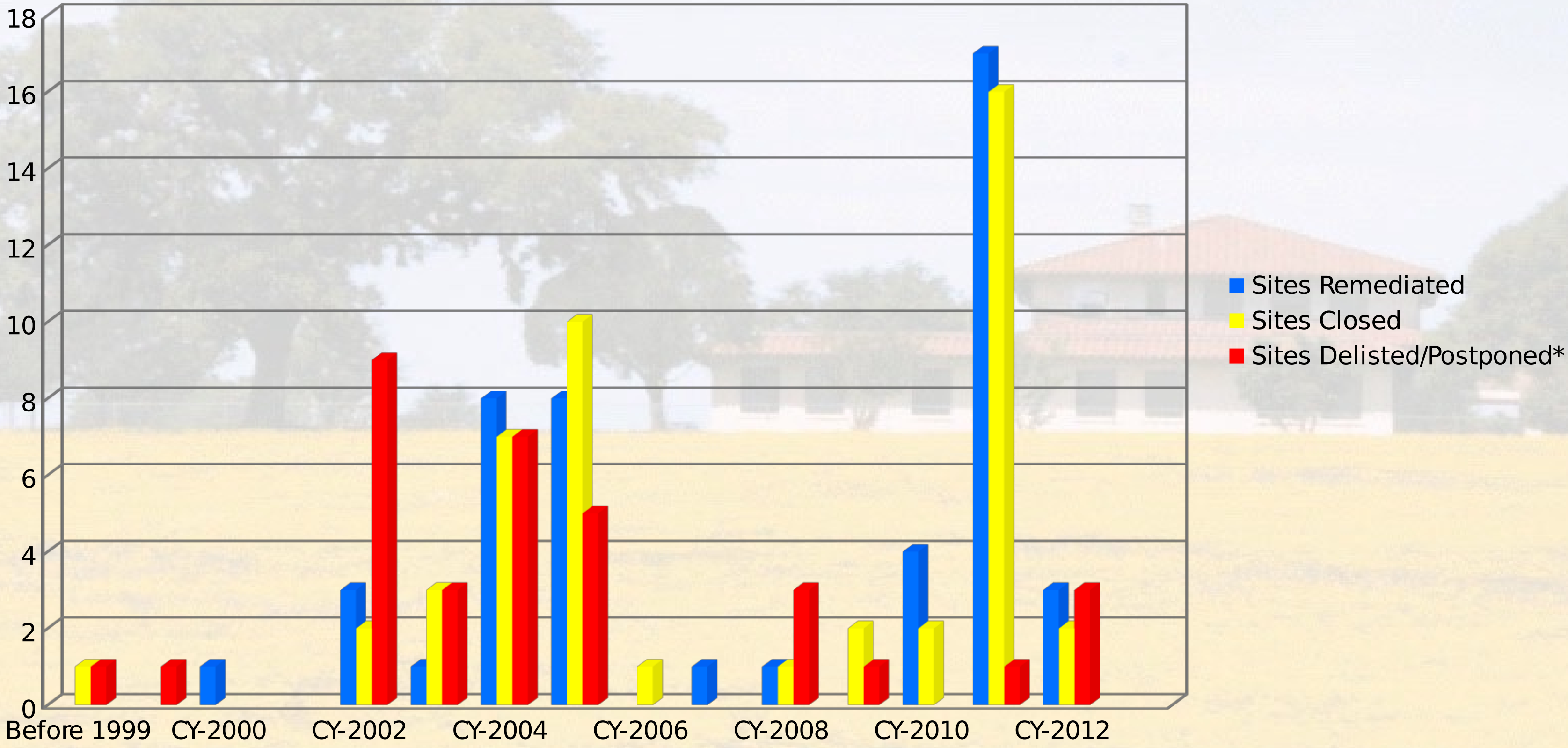
Site Status


Site Remediation
27 Initial Number of Sites
14.81%
14.81%
7.41%
62.96%
Sites Field Work Completed
Work Completion Being Verified
Sites on Queue
Sites Remaining
New Sites

Site Status FY11 – FY12



Site Closure



Historical Site Closure

Site Closure